Commercial Cleaner Troubleshooting Guide

© 2012 Hayward Industries Inc.

TABLE OF CONTENTS

KingShark 2 and KingShark 2 Plus

Safety Precautions	Page 1	Motor Removal	Page 18
Service Tools	Page 2	Pump Housing / Gear Box Disassembly	Page 19
Special Notes	Pages 3-4	Solenoid Disassembly	Page 20
Removal of Hood	Pages 5-6	Bumper / Cable Assembly Removal	Page 21
Filter Removal	Pages 7-8	Cable Assembly Components	Page 22
Power Cord Removal	Page 9	Control Panel Components	Pages 23-25
Swivel Removal	Page 10	Control Panel Troubleshooting	Pages 26-28
Accessing the Impeller	Page 11	Control Panel Timer / Relay PCB Testing	Pages 29-31
Drive Belt Removal	Page 12	Swivel Voltage Testing	Page 32
Intake Removal	Page 13	Motor / Power Cord Voltage Testing	Pages 33-35
Drive Wheel	Pages 14-17	KingShark 2 / KingShark 2 Plus Tips	Page 36
		Serial number locator	Page 37-38

Mako Shark 2 and KingShark Troubleshooting begins on Page 39

HAYWARD

Safety

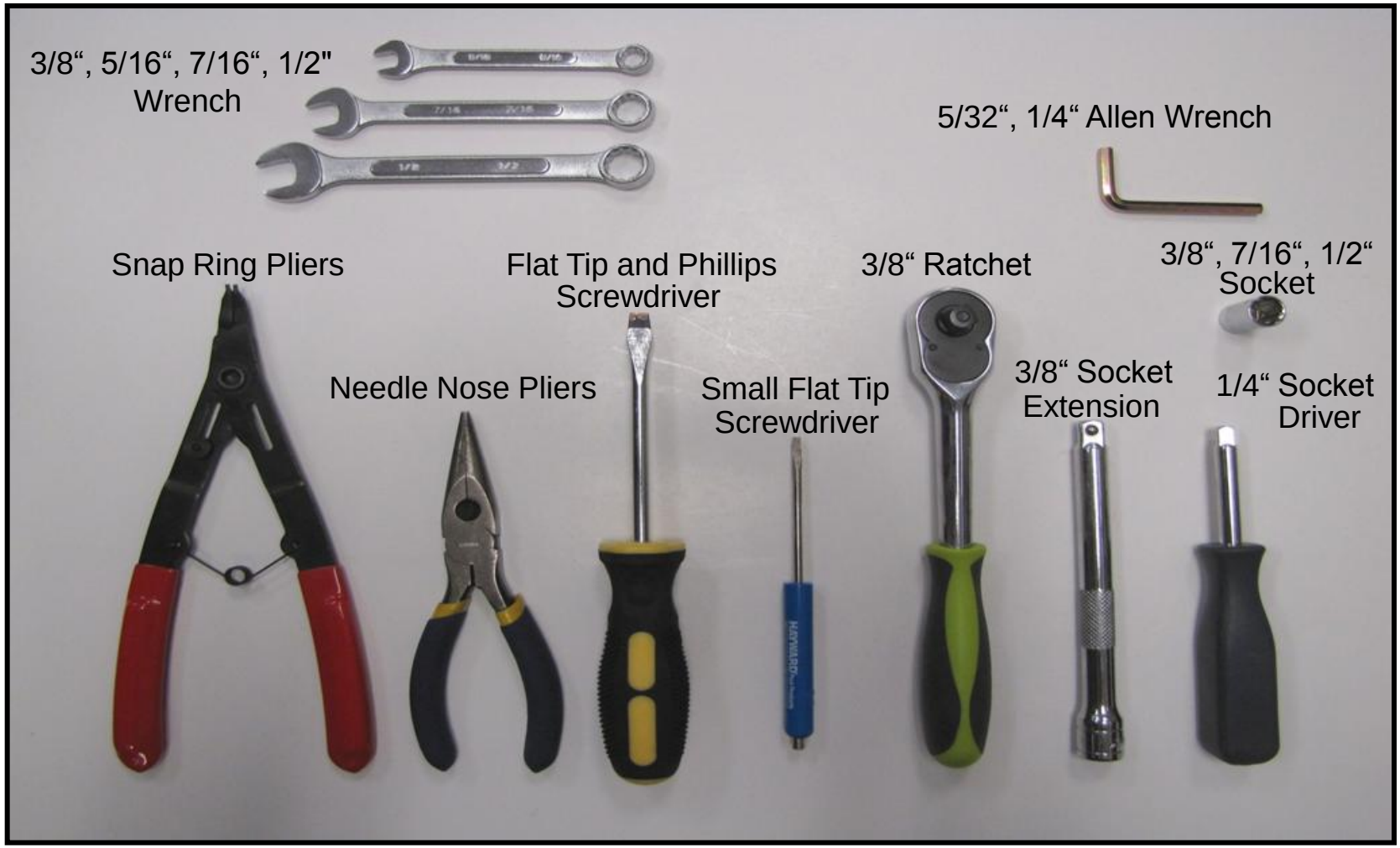
Warning - Risk of Injury

Failure to follow the safety warnings below may result in severe injury, death or property damage.

- Always place the machine in the water before connecting it to the electrical supply.
- Always connect the power supply to an approved GFCI, ground fault circuit interrupter.
- Do not handle machine while it is plugged into the electrical supply.
- Do not use an extension cord.
- Immediately remove the cleaner from the water after cleaning.
- Never allow swimmers in the pool while the cleaner is operating.
- Never allow plug or power supply unit to enter pool.
- Keep the power supply unit a safe distance from the pool edge and water.
- Keep the power supply unit dry and away from rain or other water spray.

Disconnecting and removing the unit from the pool immediately after each use will enhance the cleaner's life. 150 minutes of operation in a 30' x 60' pool should be sufficient with no more than a few twists in the cord which should be straightened out after each use.

Service Tools



Special Notes

When disassembling the KingShark 2 and the KingShark 2 Plus, the ONLY DIFFERENCES between the two cleaners are as follows:

KingShark 2

1. Standard 3 prong electrical cord
2. RCX400388 3/4 h.p. w/o swivel.
3. RCX4011 3/4 h.p. w/ swivel.

KingShark 2 Plus

1. Different pigtail connections.
2. KingShark 2 Plus has a remote.
3. KingShark 2 Plus has a cannon plug for the control panel.
4. KingShark 2 Plus has solenoids which control left and right movement from the remote.
5. RCX4020 3/4 h.p.

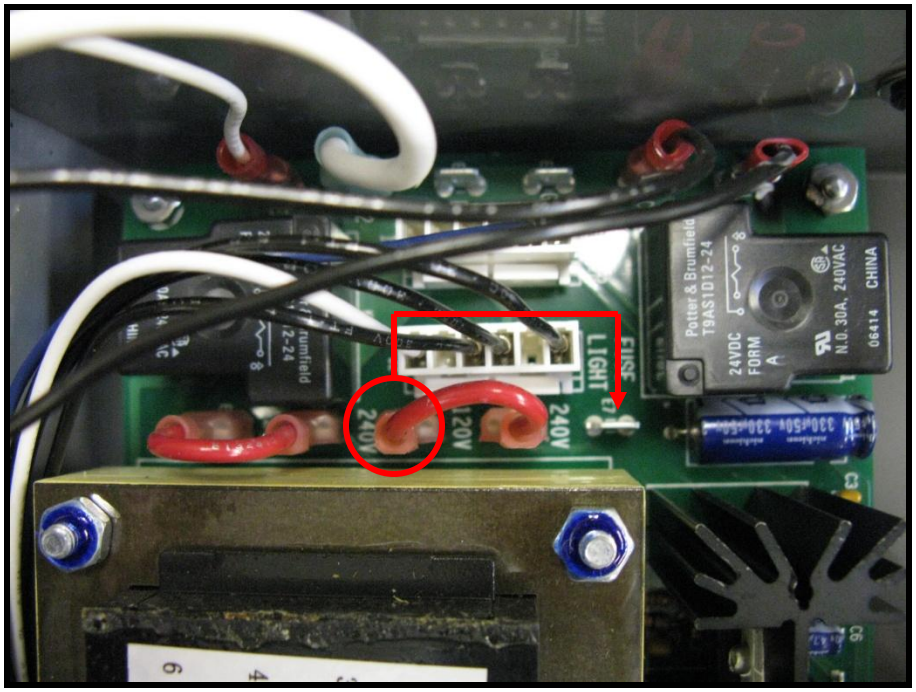
The remote has a maximum communication line to the antenna of 150'.

230 VAC Supply to Master Control Panel

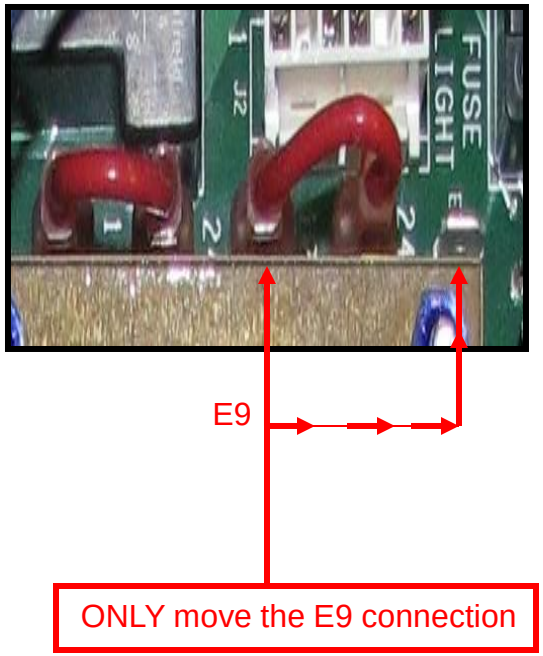
When supplying 230 VAC instead of 115 VAC to the Master control panel, the following jumper cable switch must be moved.

1. Move the jumper wire connection E9 to E7 230 VAC connection on the RELAY BOARD just above the transformer.

2. Hard wire the power cord to a dedicated 10-15 amp breaker. The master control panel draws roughly 3 amps.



Jumper configured for 240 VAC



Removal of Hood

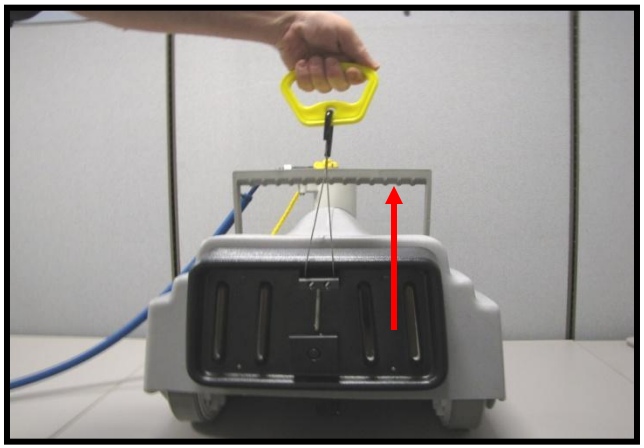
Step 1:

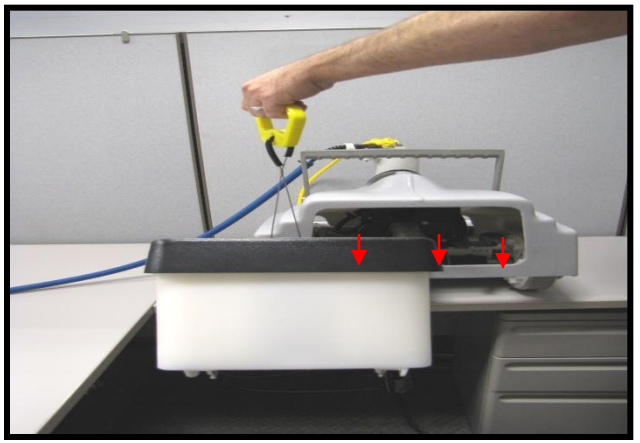
Remove the two 1/4" – 20 X 3/4" SS bolts from both sides of the cleaner using a 7/16” socket.

Note: 1 bolt and 2 plastic washers per side

Step 2:

Pull the cartridge handle quick release UP and then pull the cartridge assembly back and away from the cleaner.



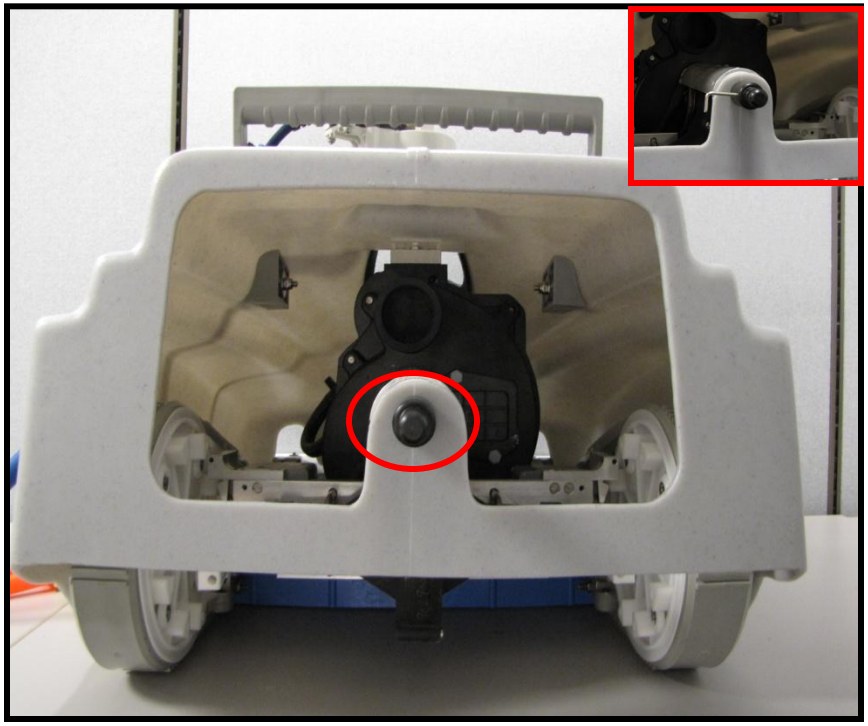


HAYWARD

Removal of Hood

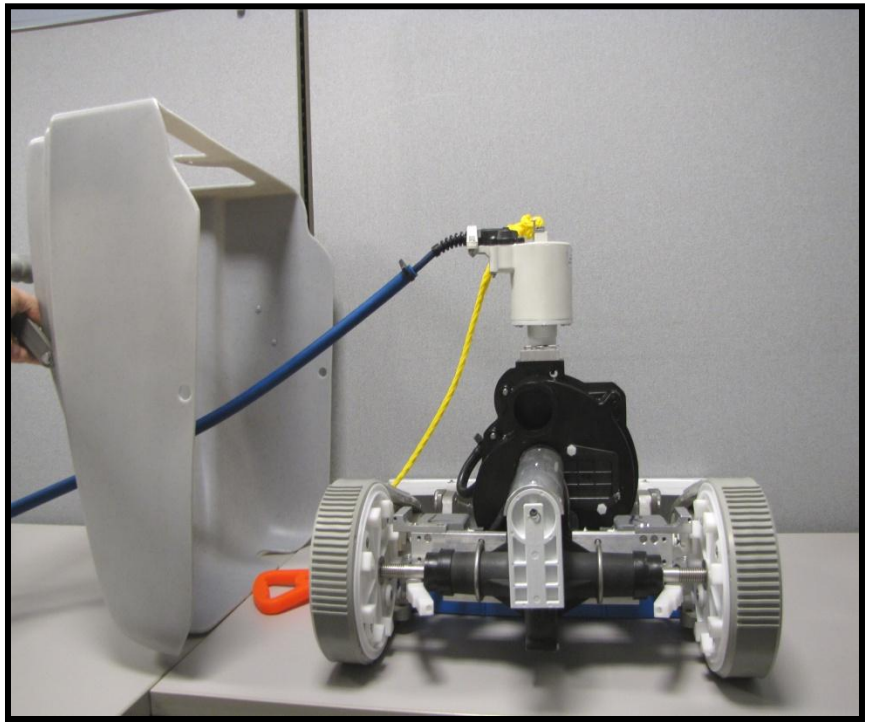
Step 3:

Unscrew the filter retainer knob using a 5/32” Allen Wrench.



Step 4:

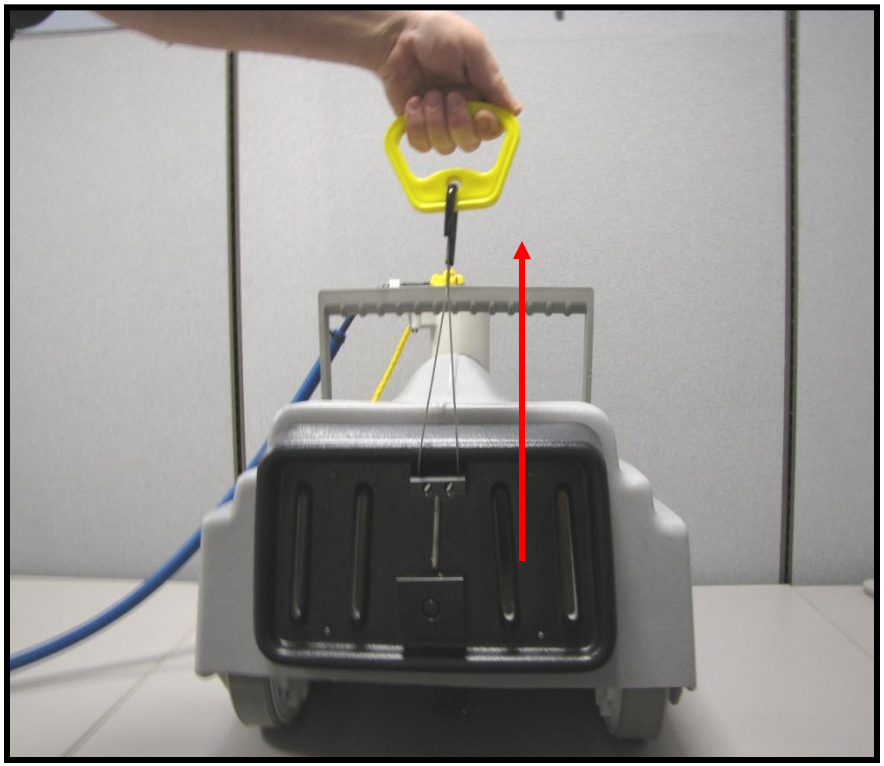
Slide the hood cover over the swivel assembly.



Filter Removal

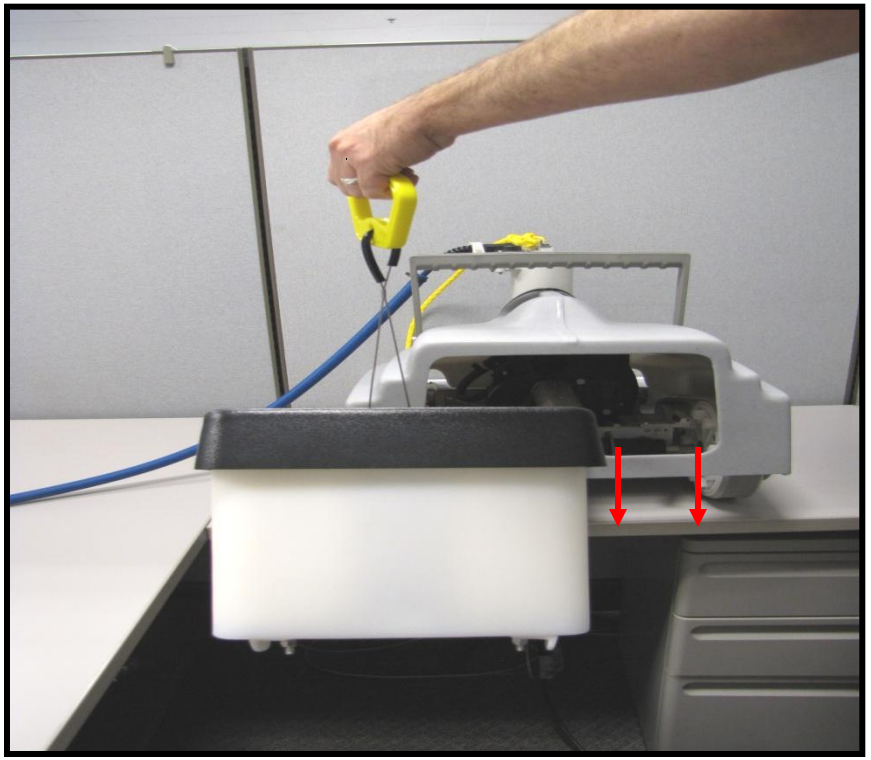
Step 5:

Pull up on the yellow quick release handle assembly.



Step 6:

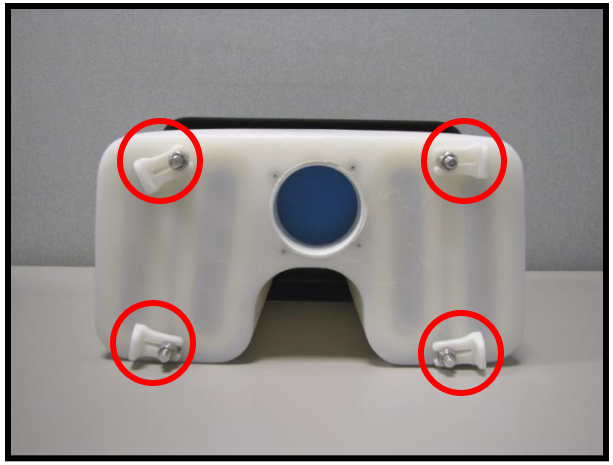
Pull and slide the filter assembly backwards and away from the cleaner.



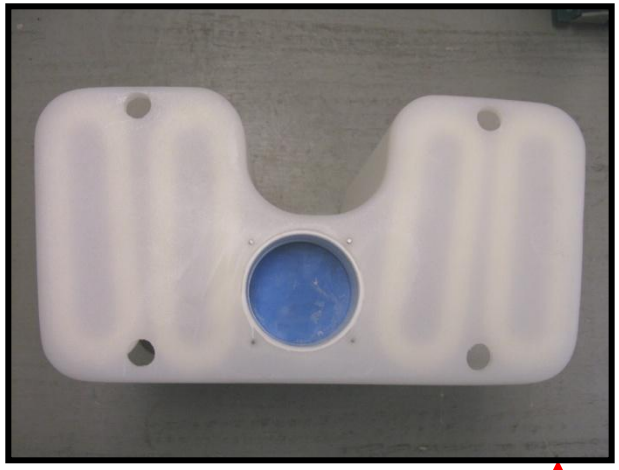
Filter Removal

Step 7:

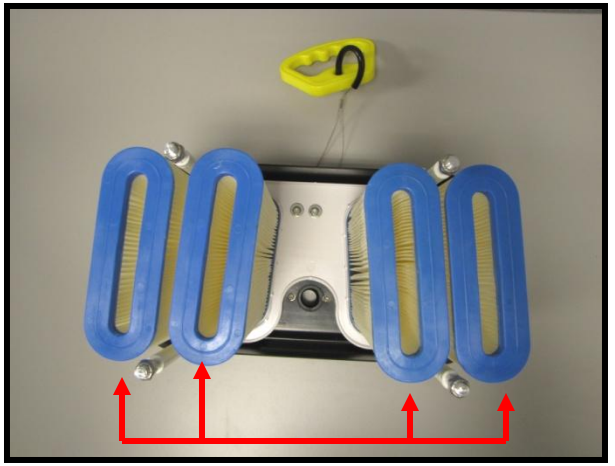
Remove the push style clips



Lift the housing assembly off the tie rods / back plate.

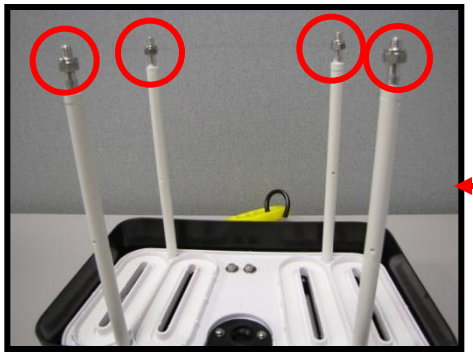


Lift the cartridges up and off the back plate.



To clean the filters, spray with clean water.

Back Plate



Note : Never remove or adjust the 4 nuts

Power Cord Removal

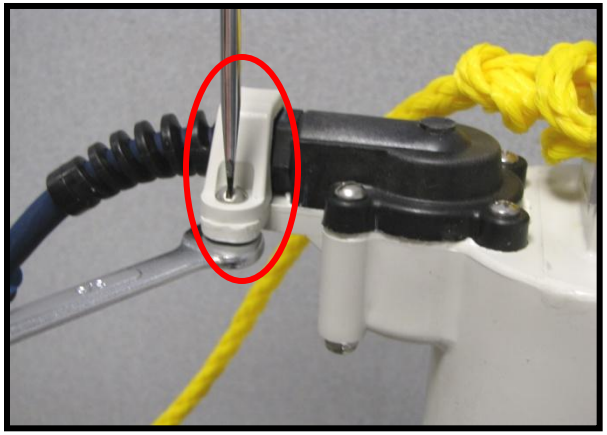
Step 8:

1. Using a flat tip screwdriver and 3/8” wrench, remove the swivel cord clamp.

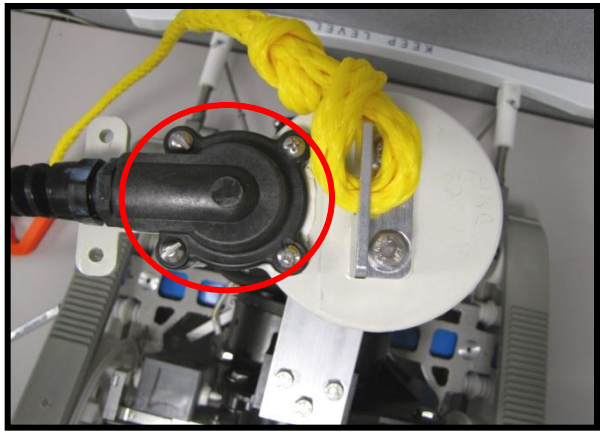
2. Using a Phillips screwdriver, remove the four screws connecting the power end to the swivel.

3. When reconnecting the power end to the swivel or motor, make sure to use RTV # 162 silicone rubber sealant and replace the o-ring.

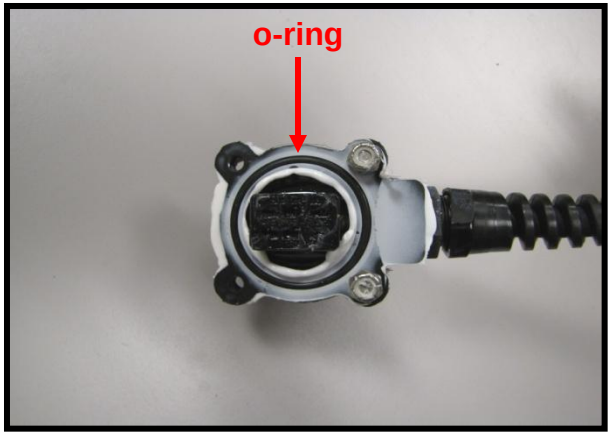
1.



2.



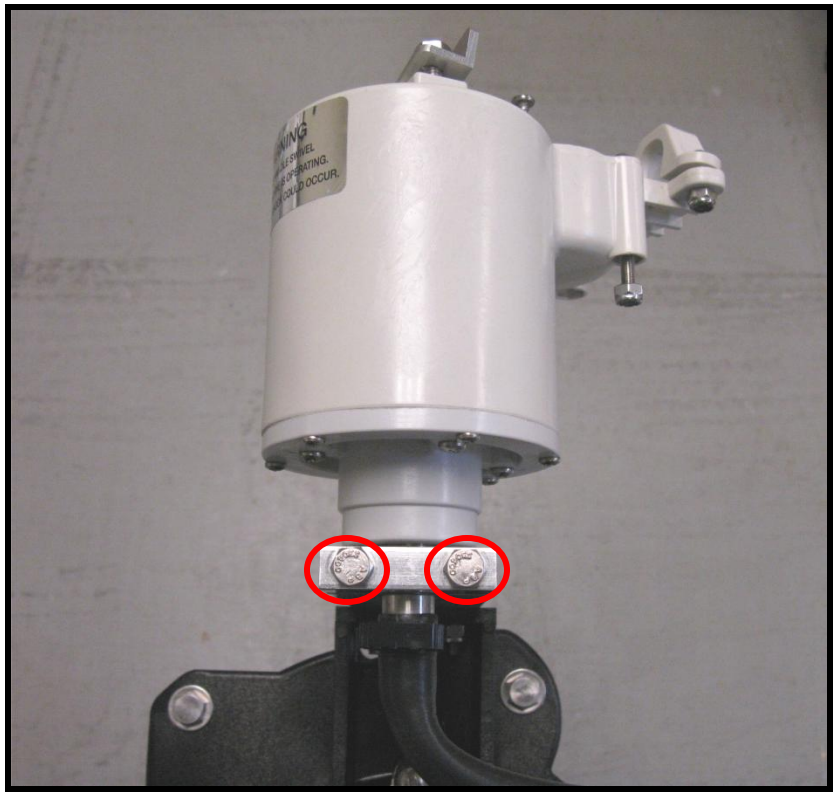
3.



Swivel Removal

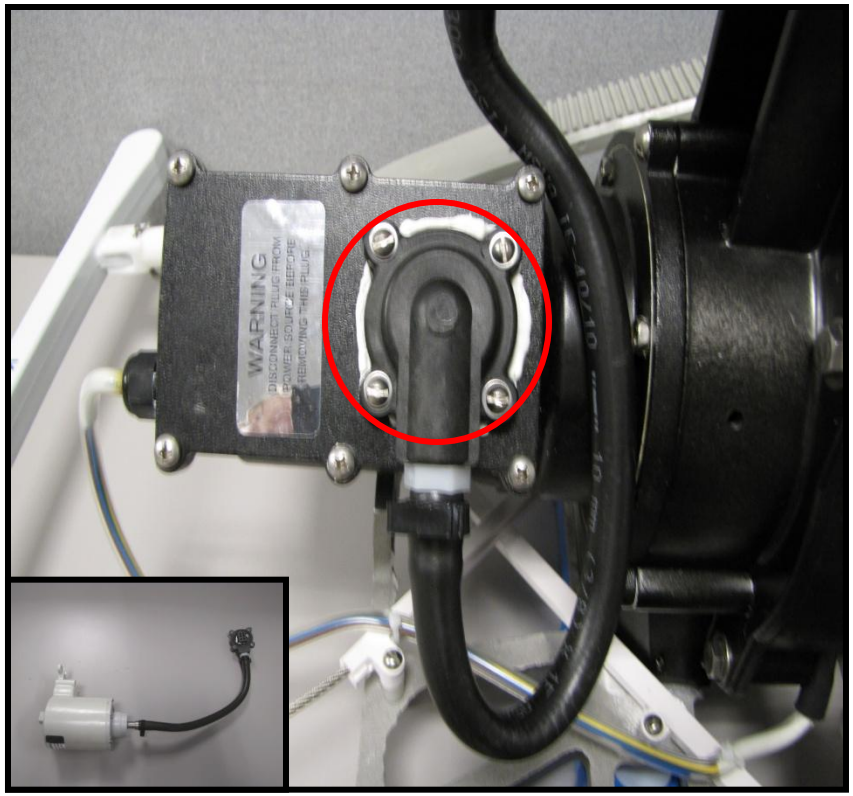
Step 9:

Using a 7/16" socket, remove the two 1/4" – 20 X 1-1/4" hex head bolts from the swivel mounting bracket.



Remove the four screws connecting the power cord to the motor end.

Note: Make sure to use RTV # 162 Silicone Rubber Sealant when reconnecting the power cord and replace the o-ring.



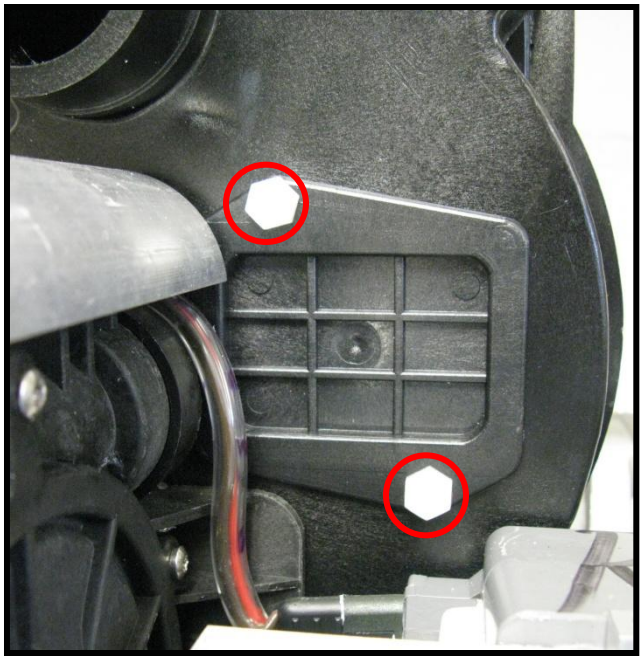
Accessing the Impeller

Step 10:

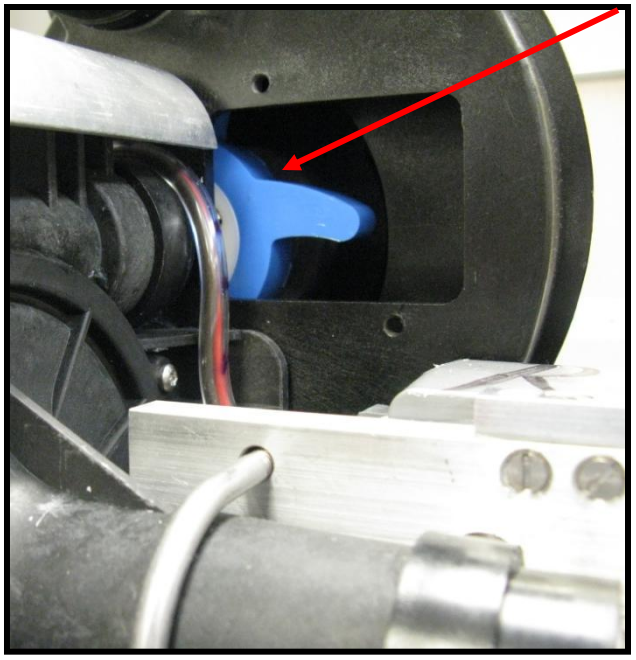
1. Use a 7/16" socket to remove the two plastic bolts and impeller access plate from the pump housing.

2. After removing the impeller access plate, this will allow you to inspect the impeller and check for debris or damage inside the impeller area.

1.



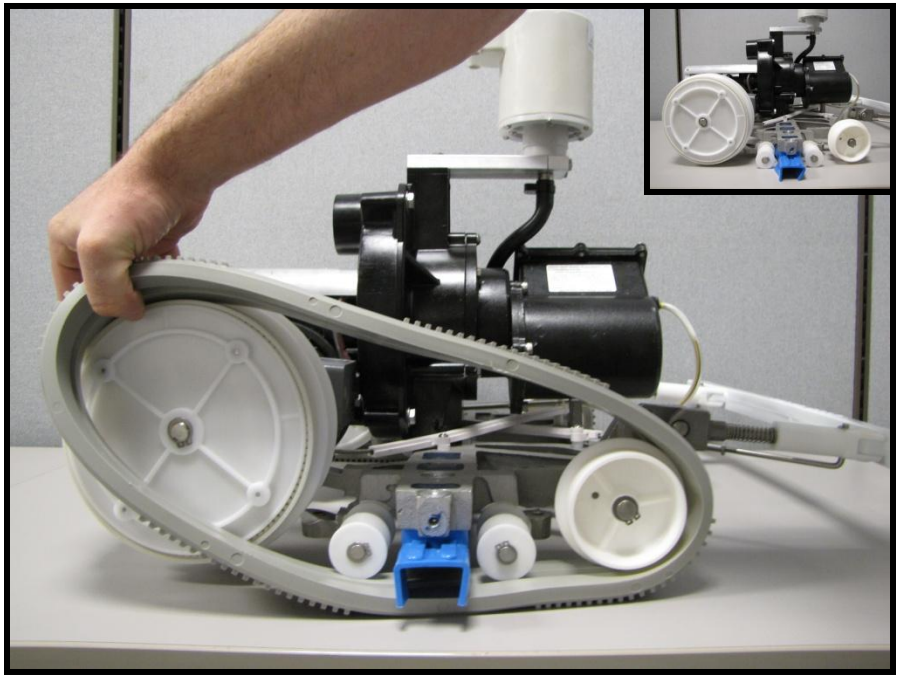
2.



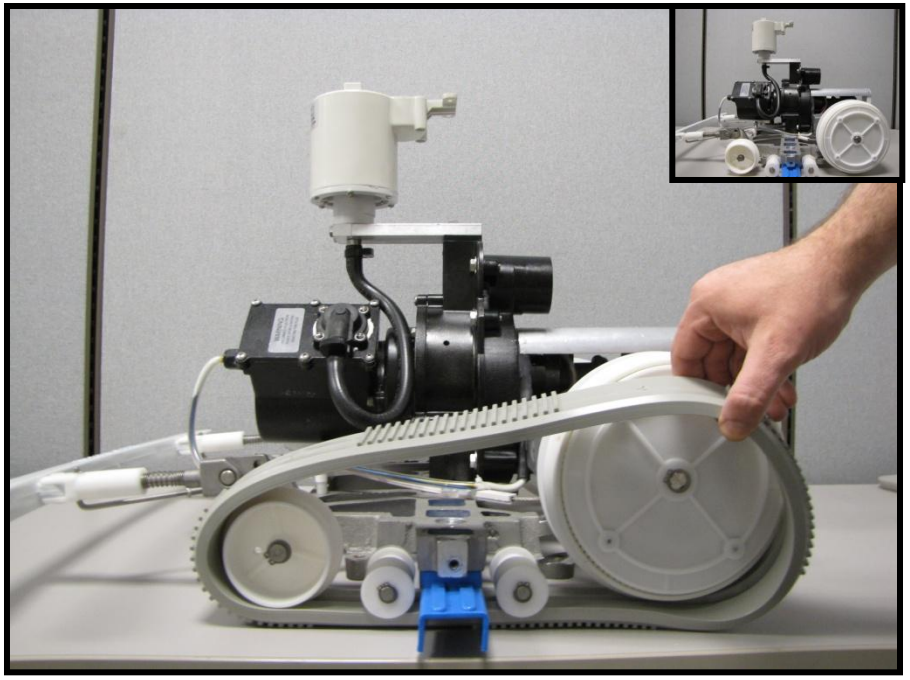
Drive Belt Removal

Step 11:

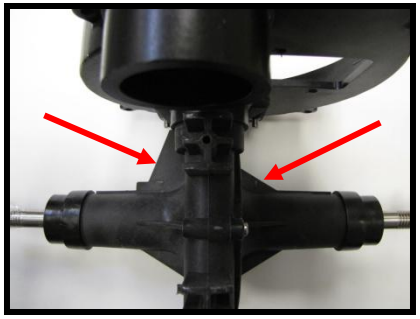
1. Remove right side drive belt.



2. Remove left side drive belt.



Note : When putting the drive belts back on, put the LEFT side on first, then the RIGHT side. This will prevent possible torque damage where the gear box assembly meets the front housing bell, since the larger support bracket is on the left side of the gearbox assembly.



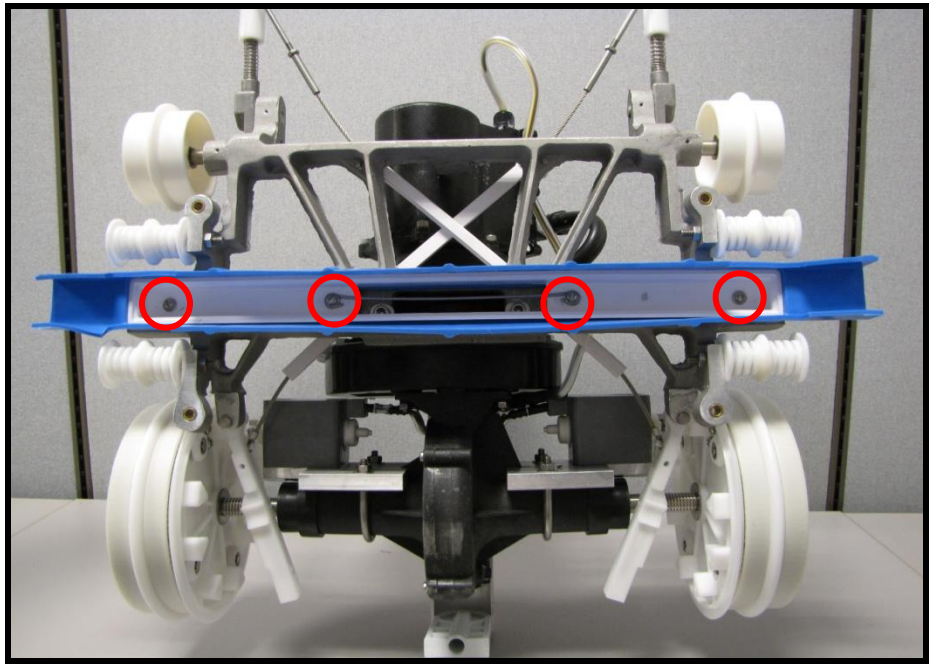
Intake Removal

Step 12:

1. Unscrew the 4 screws holding the intake to the base plate, also remove the SS wire baffle.

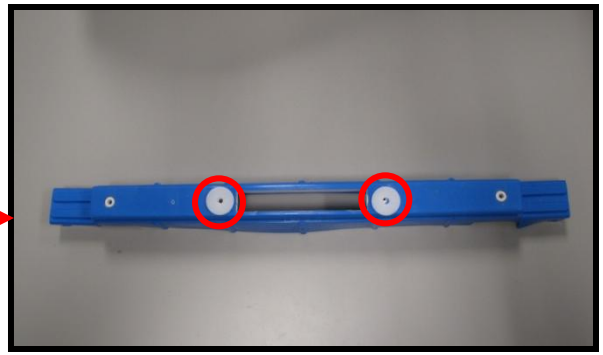
2. Remove the intake stabilizer from the intake. The stabilizer prevents large debris from entering the cleaner.

1.



NOTE : When removing and reinstalling the Intake, be aware of the 2 plastic washers that seat between the Intake and the base plate.

2.

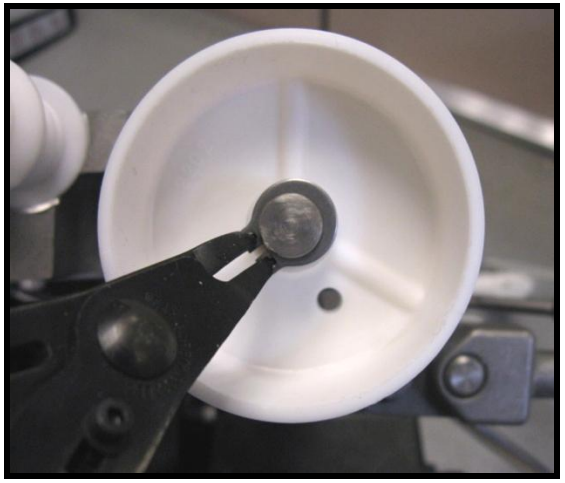


Drive Wheel Disassembly

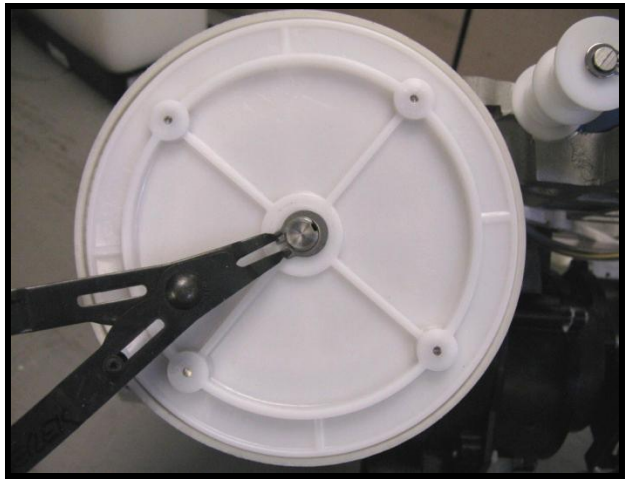
Step 13:

1. Using the snap ring pliers, remove the snap ring from the front wheels and the rear drive wheels.
2. After removing the snap rings from the wheels, pull the front wheels from the base plate and remove the drive wheels from the gear box assembly.

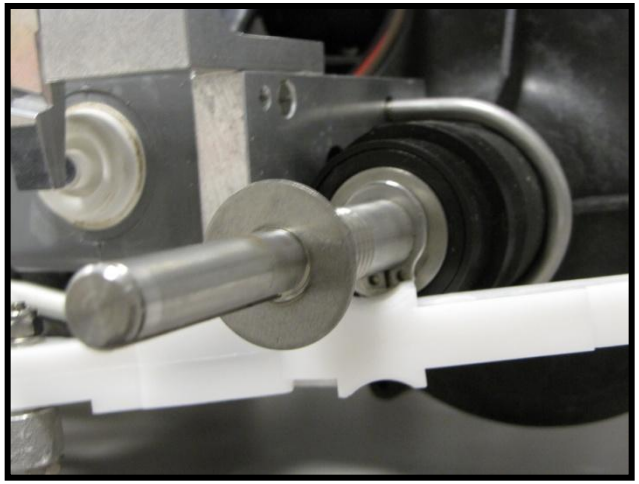
1. Front Wheels



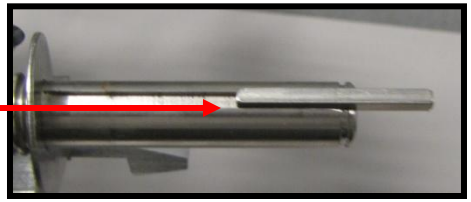
2. Drive Wheels



Note : There is one SS washer on each side of the gear arm.



Note: There is one 1/8" SS Key on each rear drive wheel It is important the key is installed into the wheel prior to inserting the shaft.



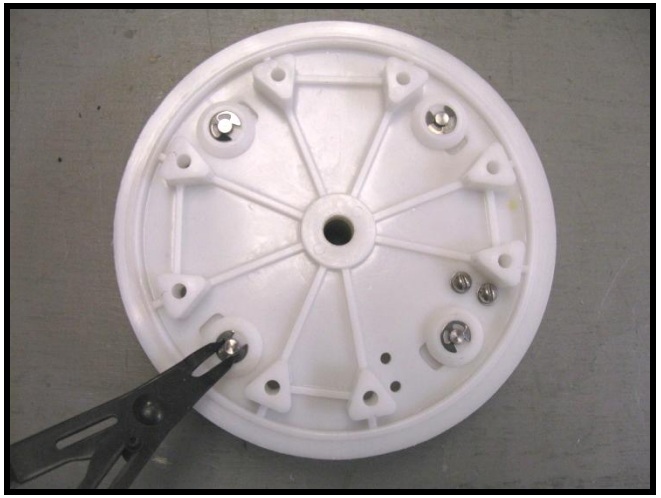
Drive Wheel Disassembly

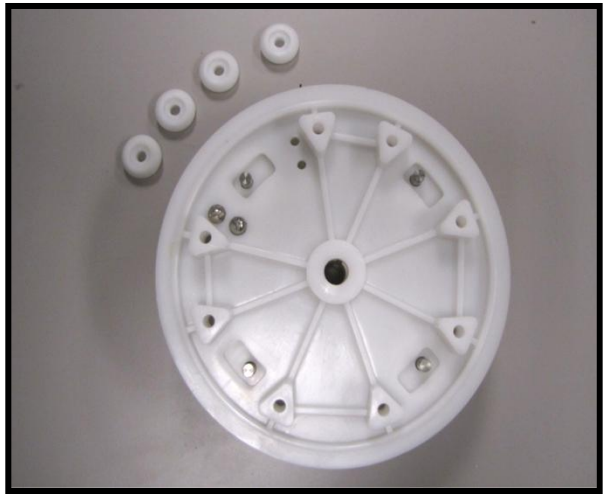
Step 14:

1. Use the snap ring pliers to remove the 4 E-Clips from the L & R drive wheels. Remove the 4 plastic washers / spacers.

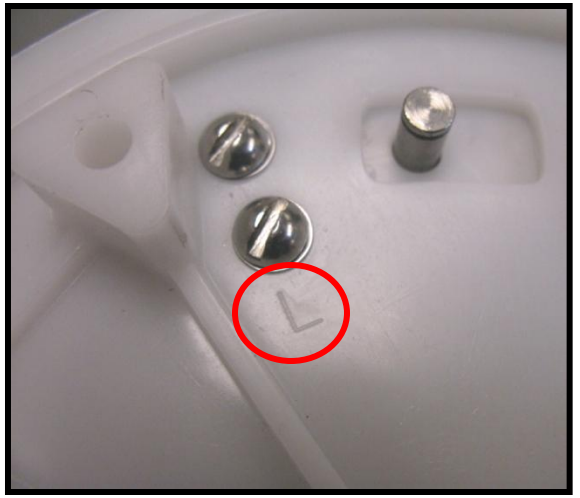
2. Remove the 2 indicator screws from the drive wheels – Each set of screws indicate LEFT drive wheel specific or RIGHT drive wheel specific. Below the 2 indicator screws, the letter L or R will be molded into the wheel.

1.





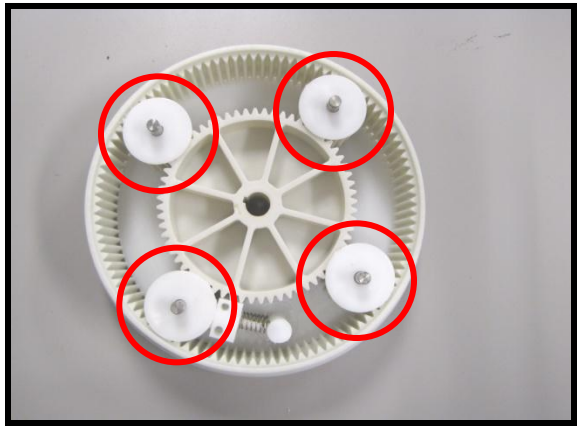
2.



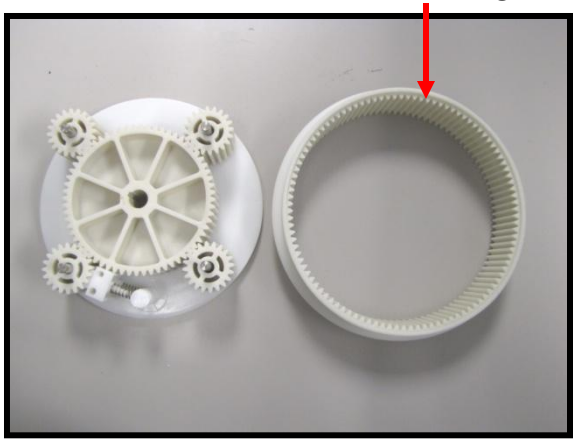
Drive Wheel Disassembly

Step 15:

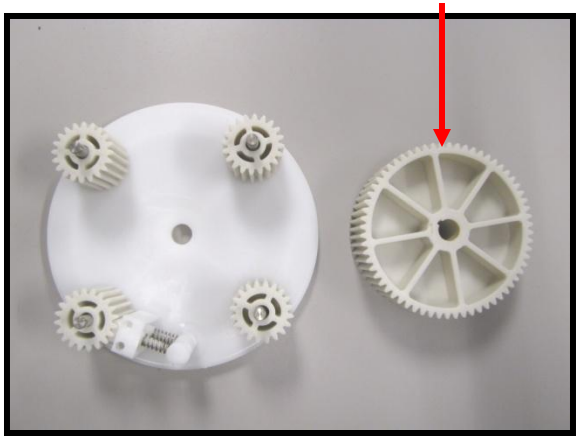
1. Remove the 4 Button Washers



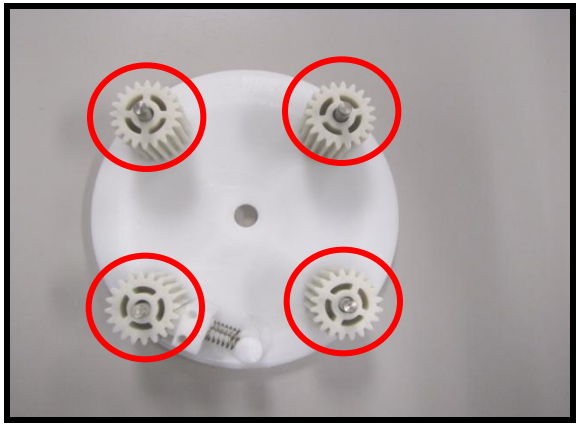
2. Remove the Gear Ring



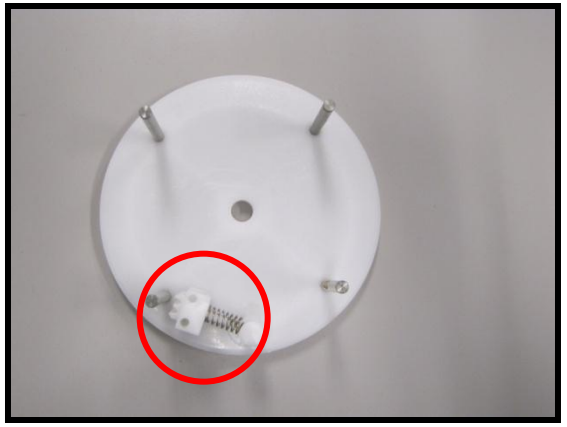
3. Remove the Sun Gear



4. Remove the 4 Planetary Gears



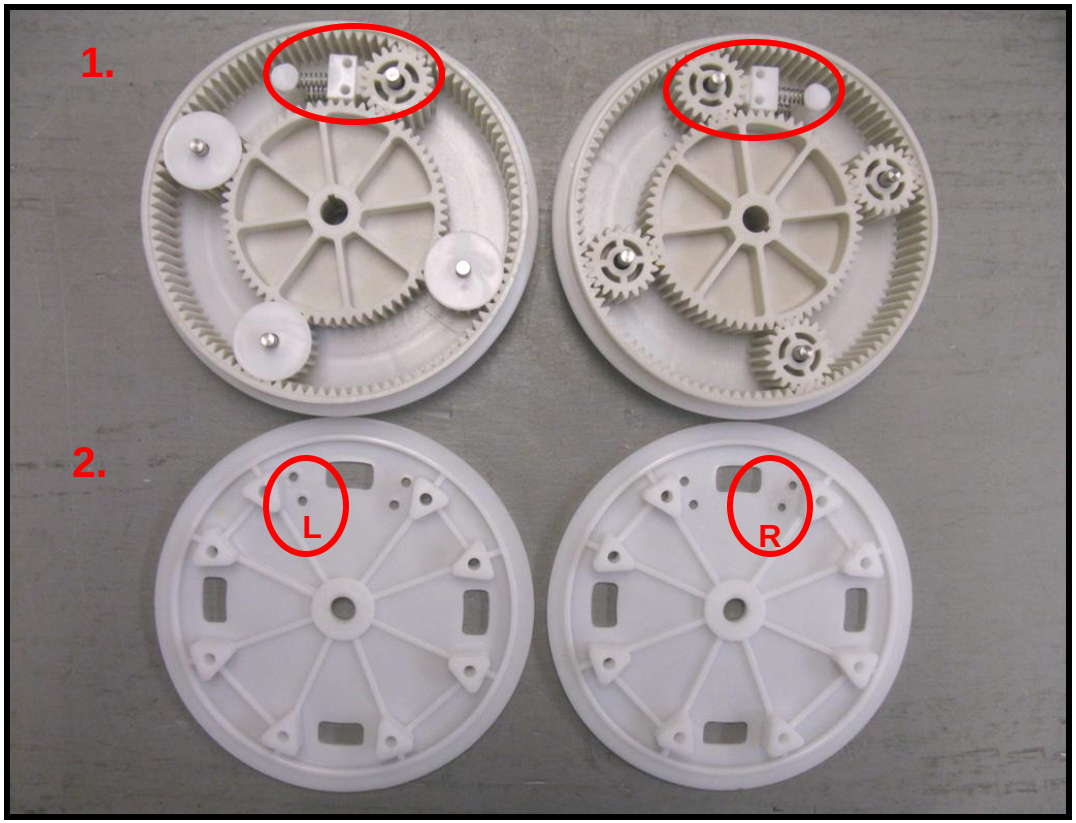
5. Remove the Wheel Lock



Drive Wheel Reassembly

1. When reinstalling the drive wheels, make sure the Wheel Locks are installed in the correct direction and position. The photo's below indicate the correct position and direction.

2. The outside wheel plate screws must match the L or R indicator markings on the outside wheel plates.



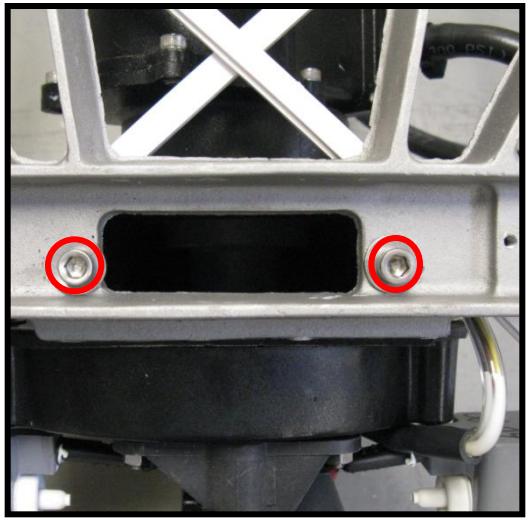
LEFT DRIVE WHEEL RIGHT DRIVE WHEEL

Motor Separation

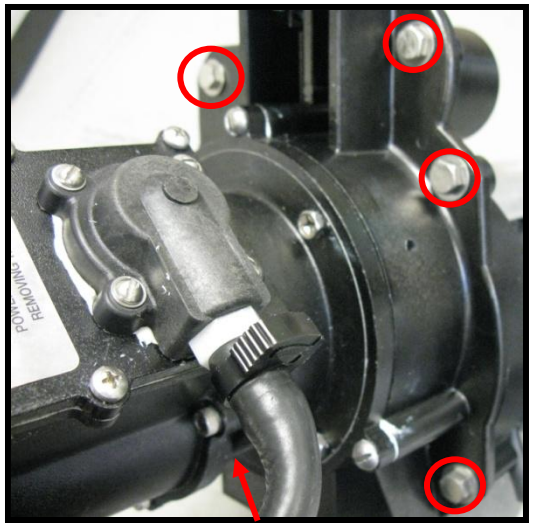
Step 16:

1. Use a 1/4" allen wrench to remove the 2 bolts and washers. Once these are removed, lift the motor from the base plate.
2. Use a 1/2" socket to remove the 5 bolts and washers that hold the motor to the pump housing.
3. Use a flat tip screw driver to remove the 4 impeller screws.
4. Unscrew the 2 screws and 1 - 7/16” bolt to separate the motor from the housing bell.

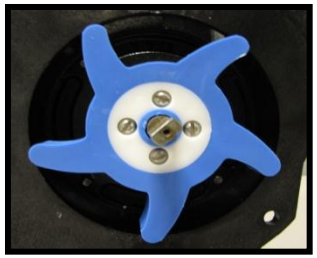
1.



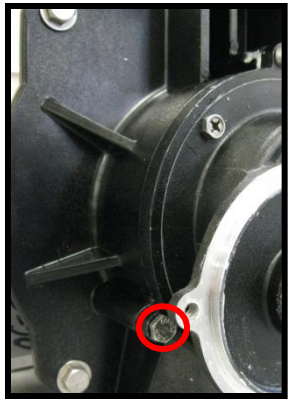
2.



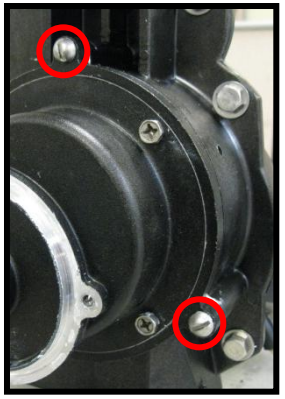
3.



4.



Left View



Right View

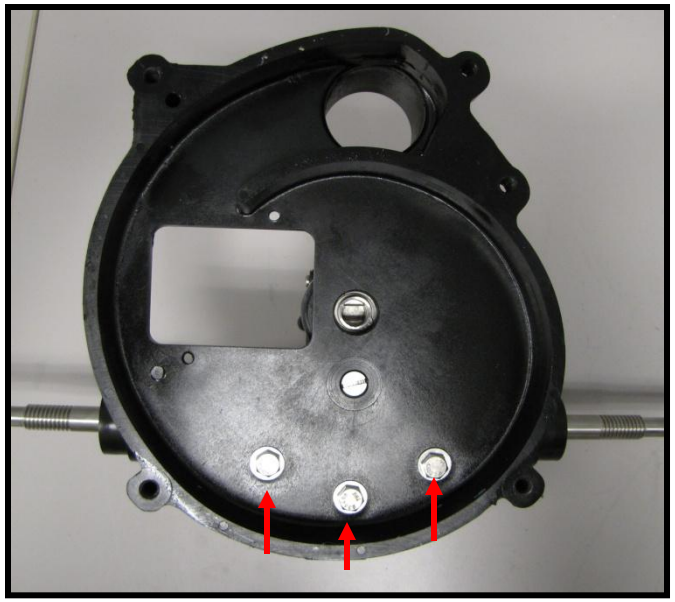
Pump Housing / Gear Box Disassembly

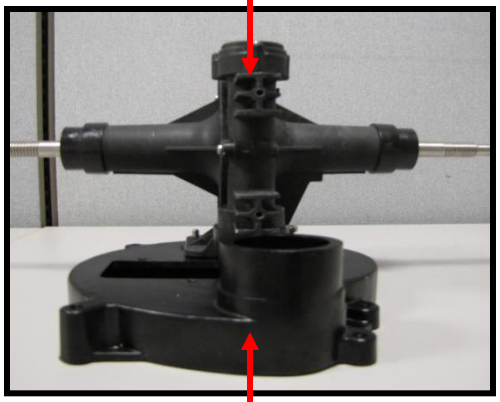
Step 17:

1. Use a 7/16" socket to remove the 3 bolts from the pump housing. Pull the pump housing from the gear box assembly.

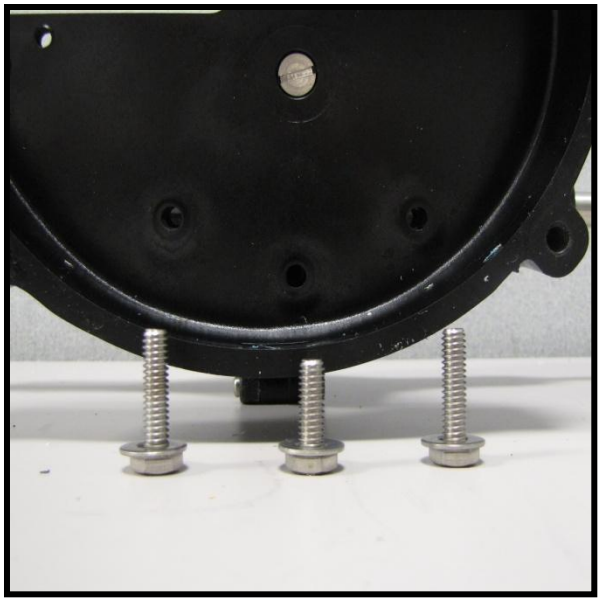
2. After removing the 3 - 7/16" bolts, note the length and location of each bolt for reinstallation.

1.





2.



Solenoid Disassembly

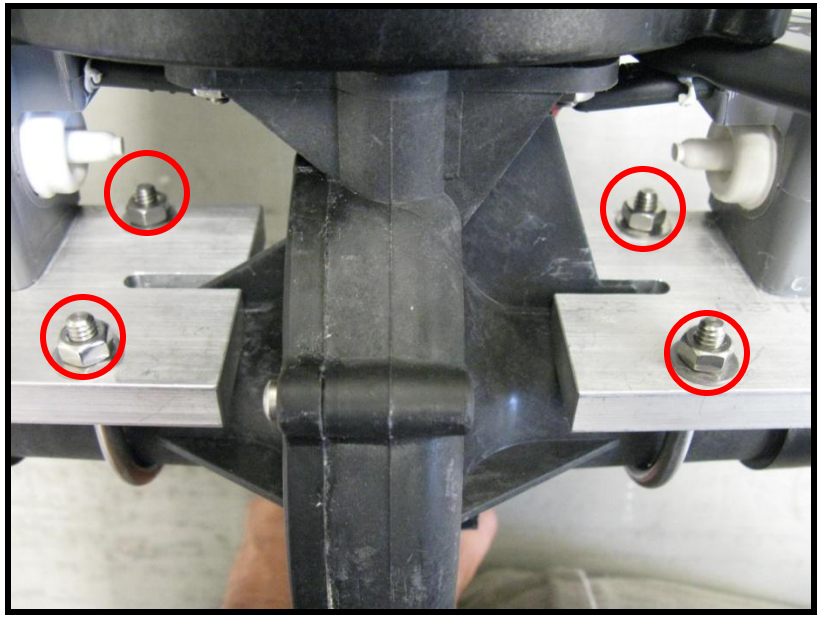
Step 18:

1. Use a 7/16" wrench to remove the 4 retention nuts from the U bolts.

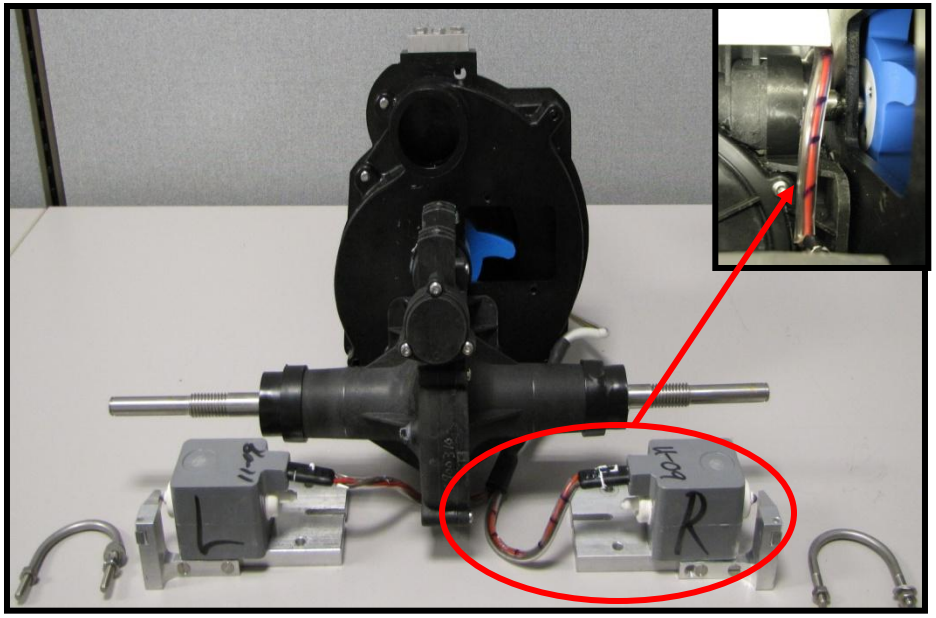
2. Once the 4 retention nuts are removed, the solenoids can be set aside. To separate the solenoids from the motor, pull and separate at the quick connection at the solenoid.

Note: Solenoids are marked left (L) and right (R) . The power cord that has the black lines indicates **the right solenoid** connection. (see insert picture, photo #2)

1.



2.



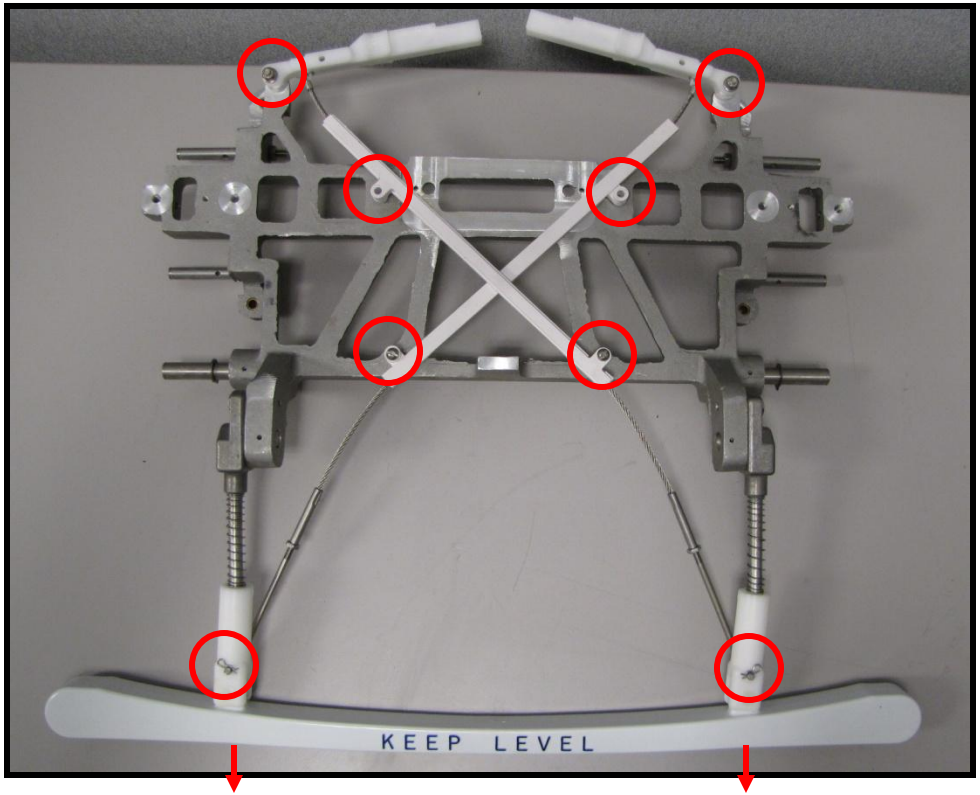
Bumper / Cable Assembly Removal

Step 19:

1. Remove the two 3/8” nuts (top), four flathead screws (center), and two pins (bottom).

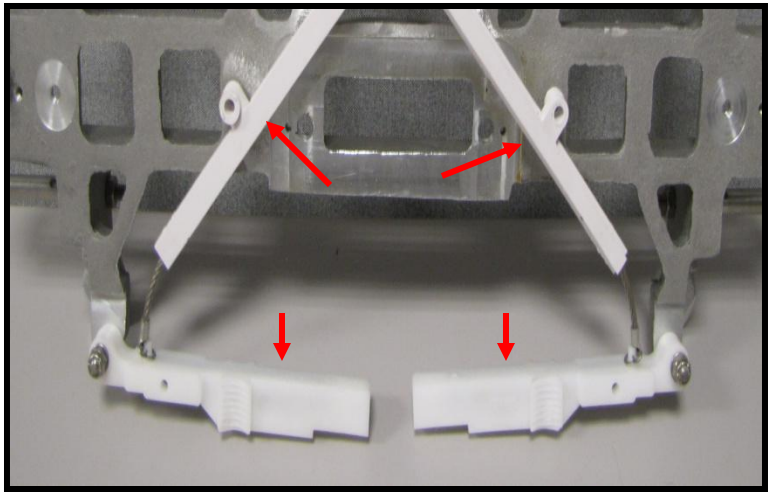
2. Slide the bumper from the arm sensor bar.

1.



Note: Both the reversing arms and cable assembly can be turned over and be reused

2.

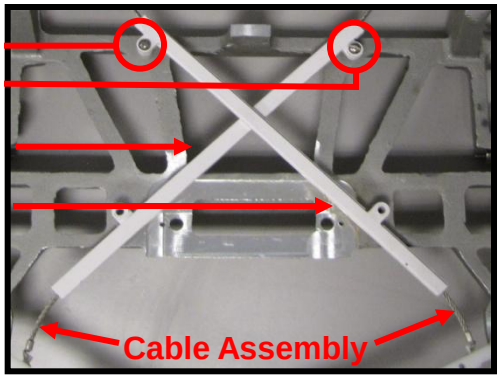


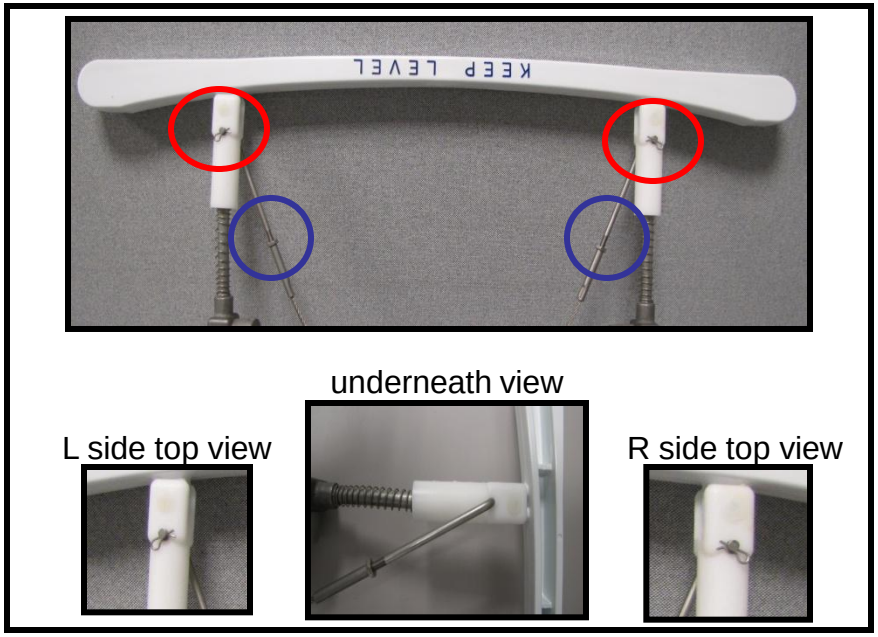
Instructions for Reinstalling the Cable Assembly

Cable assembly's do not come pre-tensioned from the manufacturer

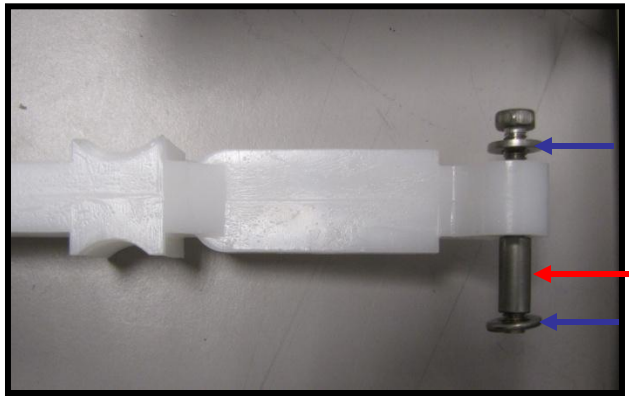
1. Tension cables / cable assembly are adjustable.
2. Once the cable assembly is reinstalled, push in on the sensor bar. The L & R reversing arms should touch the inside of the drive wheels.
3. Release the sensor bar, it should "spring" back to it's normal position, if it doesn't, tighten or loosen accordingly (blue).

Back to front view - TOP



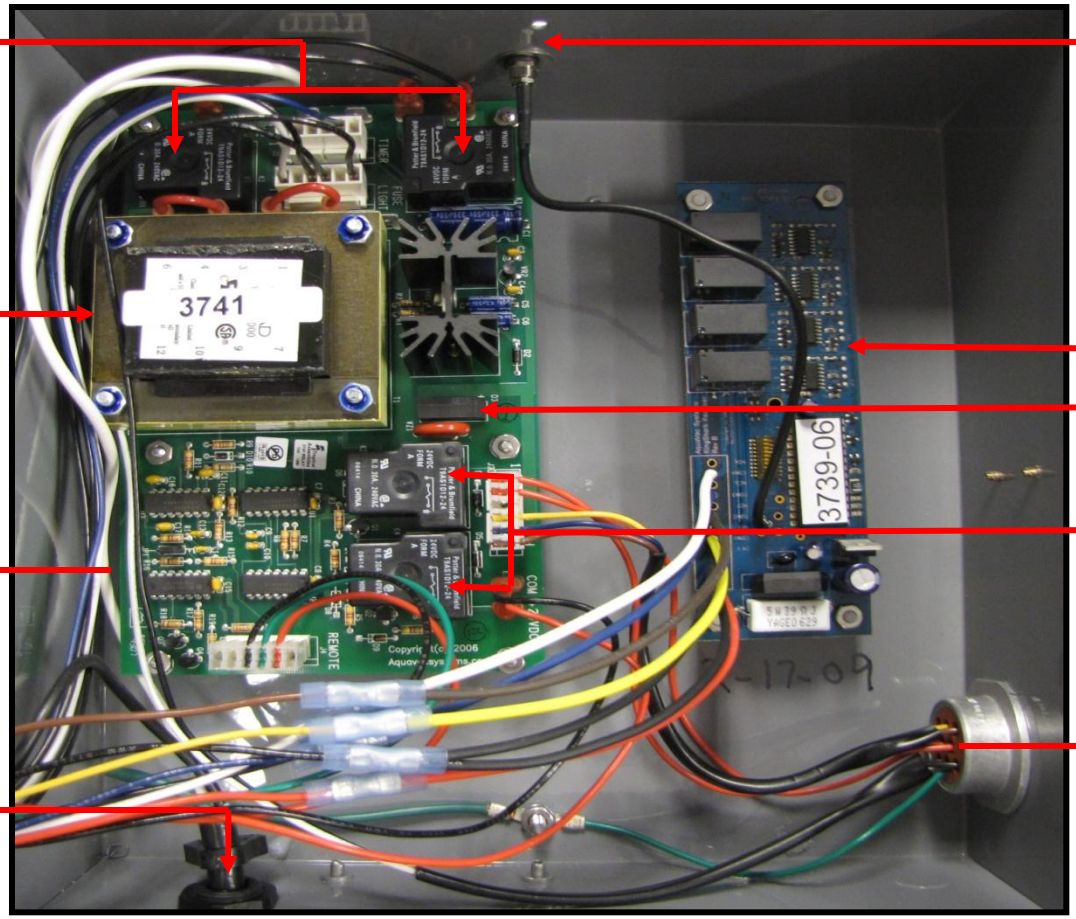


Note the proper location of the washers and spacer when reinstalling the L & R reversing arms.



Master Control Panel

Relay Board / Receiver Board



24 VDC relays

Antenna

Transformer

Receiver Board

AC to DC rectifier

Relay Board

24 VDC relays

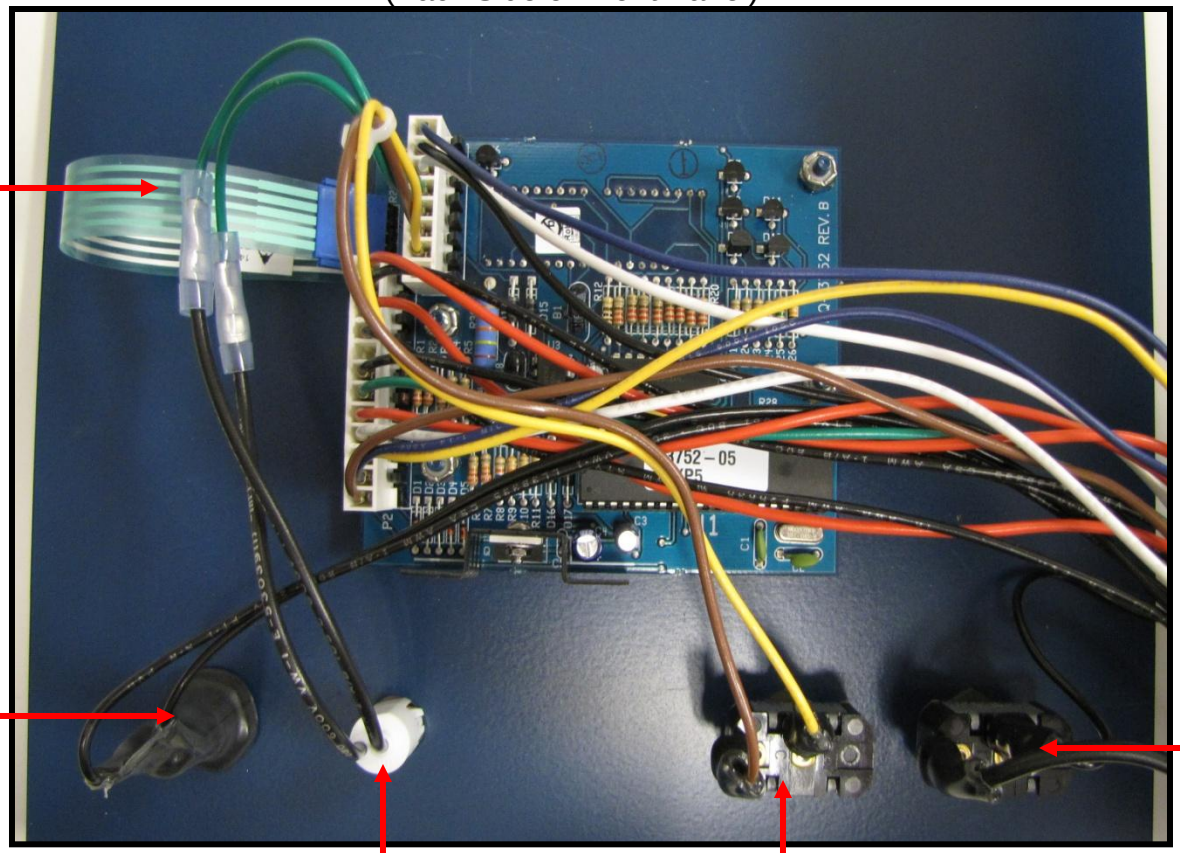
Power out to cleaner

Incoming power supply

Master Control Panel

Timer Board

(Back Side of Front Panel)



Display ribbon cable

Note: Ribbon cable disconnects at the Timer Board

Fuse

Power Indicator Light

Auto Turn On / Off Switch

Power On / Off Switch

Master Control Panel

Step 20:

1. Power cord MUST be plugged into a grounded electrical outlet equipped with a Ground Fault Circuit Interrupter (GFCI)

If you supply power to the master control panel and you have no display, this is **NORMAL**.

Unless you have the Cannon Plug power cord from the swivel connected to the 2 center ports, the display will be blank. This will prevent any shocking hazards that may occur with the power connection at the master control panel.

1.

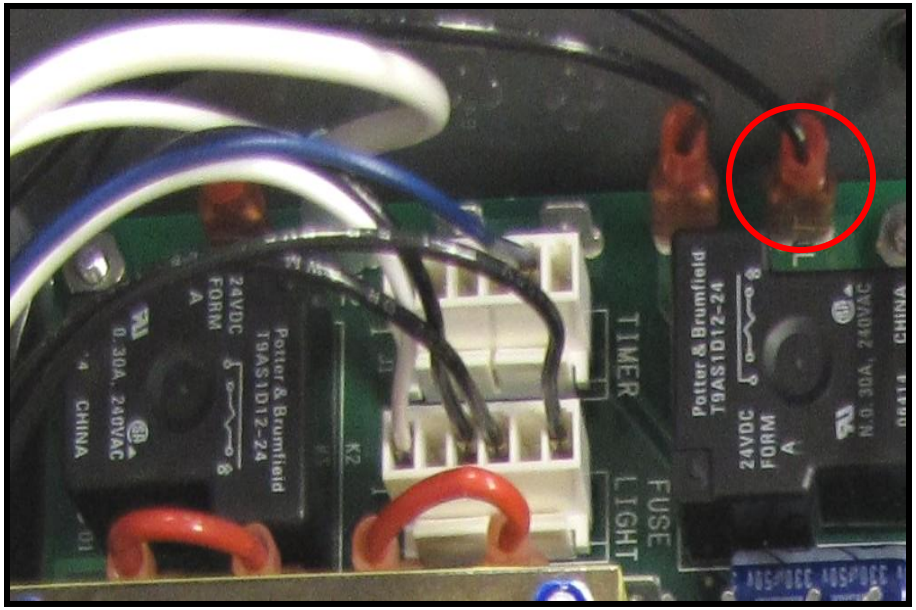
CAUTION CAUTION CAUTION
ALL SWITCHES MUST BE IN THE OFF POSITION BEFORE CONNECTING THIS PLUG. FAILURE TO DO SO MAY RESULT IN DAMAGE TO THE MACHINE.

Master Control Panel

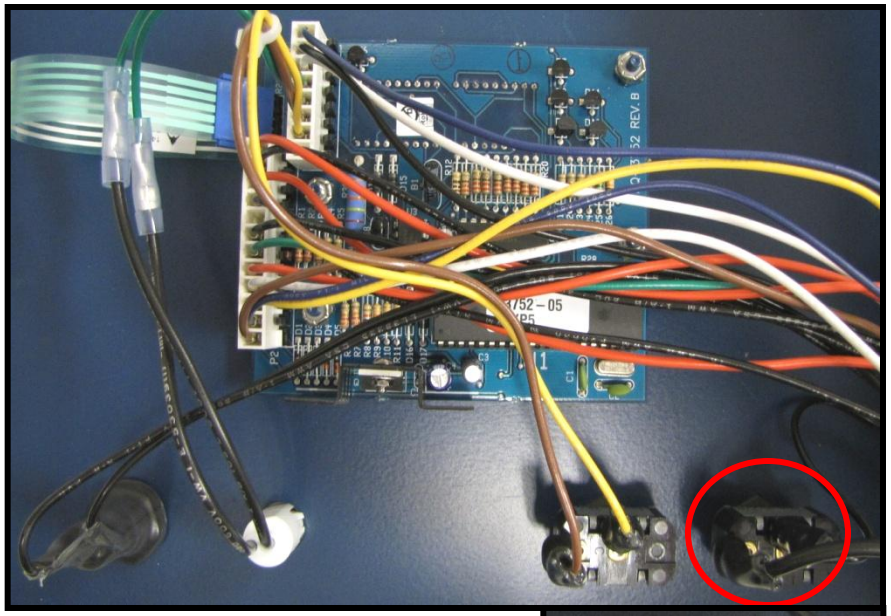
Step 21: Correct power to Master Control Panel but NO display

1. Make sure power is ON. Put one meter lead on L1 connection and one lead on L2, 115 VAC should be present.
2. Put meter lead on the on/off switch and one lead to ground, 115 VAC should be present.

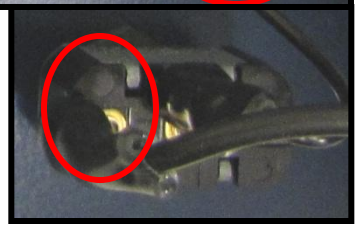
1.



2.



NOTE: Check voltage on LEFT connection of switch



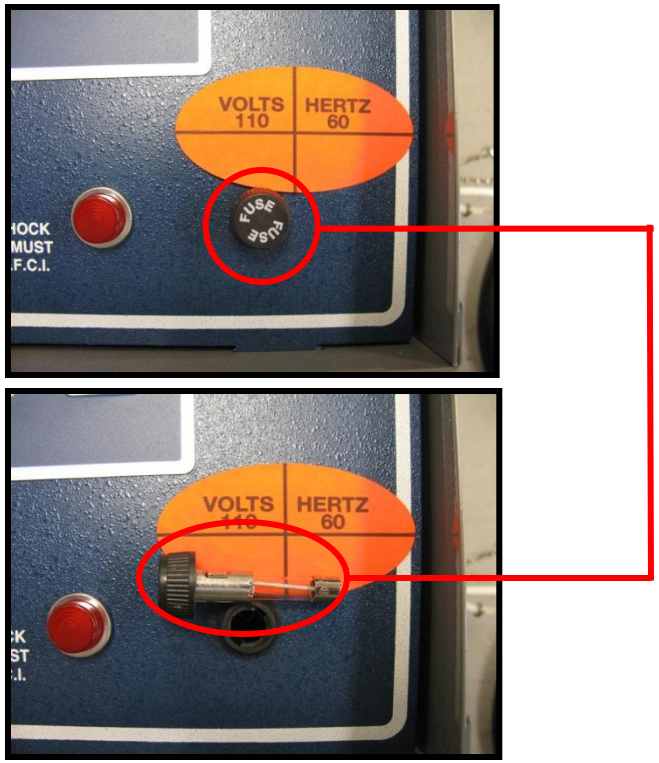
Master Control Panel

Correct power to Master Control Panel and NO display

Check for a blown fuse. Twist the fuse left and pull out for access.

Slo-Blo 1 amp / 250VP

Do a continuity check on the fuse to verify if fuse is good or bad

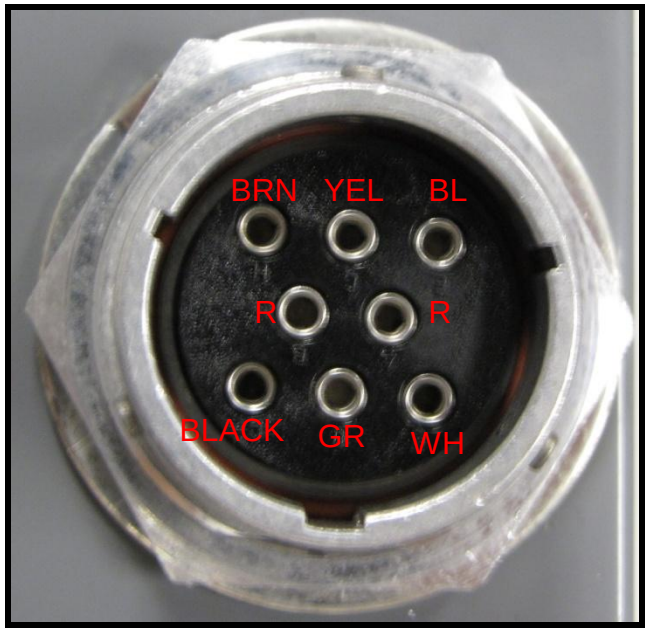


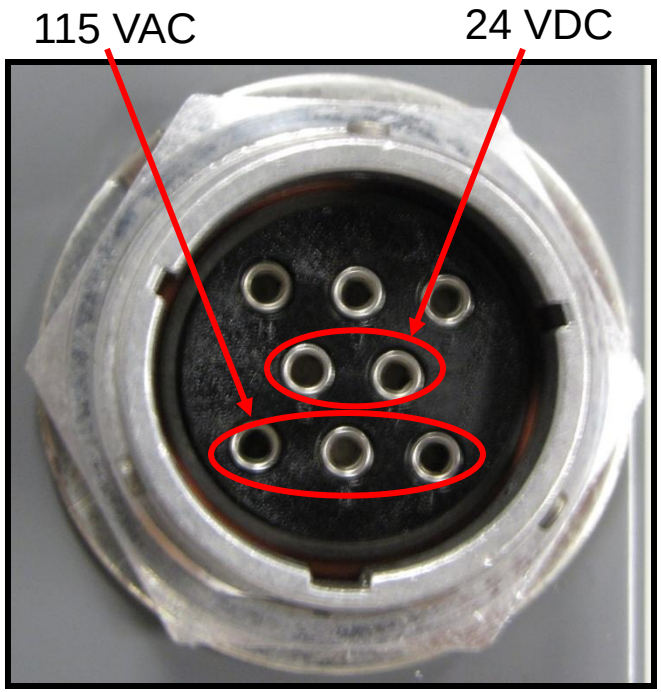
Master Control Panel Cannon Plug

Step 22:

To verify 115 VAC is being supplied through the female cannon plug receiver, install a jumper wire into the 2 center ports. Power the unit on and press the“Start“ button until “RUN“ is on the display. Then, stick one meter lead into the **black** port and the other lead into the **white** or **green** port. 115 VAC + or - should be present.

CAUTION CAUTION CAUTION
ALL SWITCHES MUST BE IN THE OFF POSITION BEFORE CONNECTING THIS PLUG. FAILURE TO DO SO MAY RESULT IN DAMAGE TO THE MACHINE.





Master Control Panel

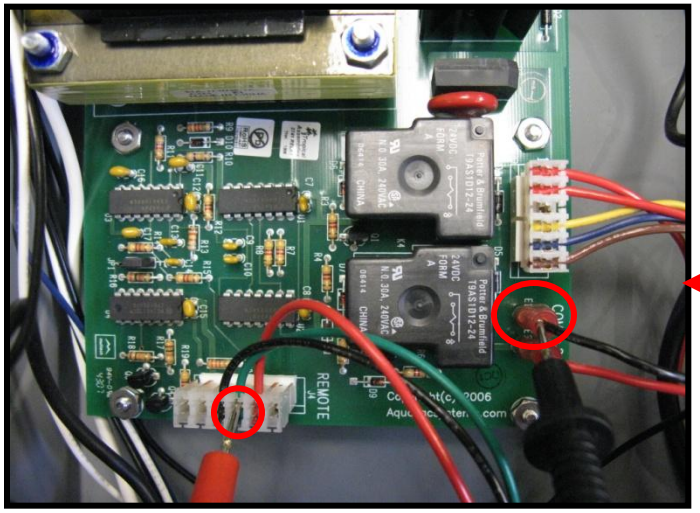
Step 23:

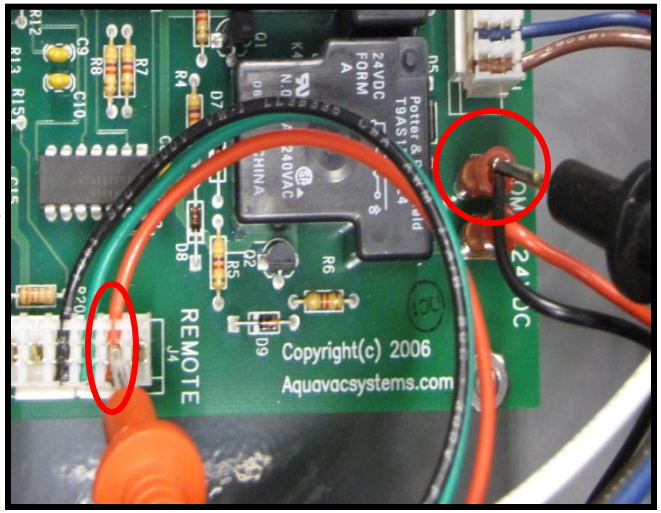
Timer PCB Testing

On RELAY PCB at REMOTE J4

- Using RED lead of DC voltmeter at green wire on J4 and **BLACK** lead of DC voltmeter at COM (E12). Voltmeter should read 24 VDC. Now, push RIGHT TURN button on the remote, voltmeter should read 0 VDC

- Do the same test procedure on the RED wire – push LEFT TURN button on the remote, voltmeter should read 0 VDC





If the unit still does not run, proceed to Step 25 on Page 32.

Master Control Panel

Step 24:

RELAY PCB Testing

On RELAY PCB at J3 (B A G H F)

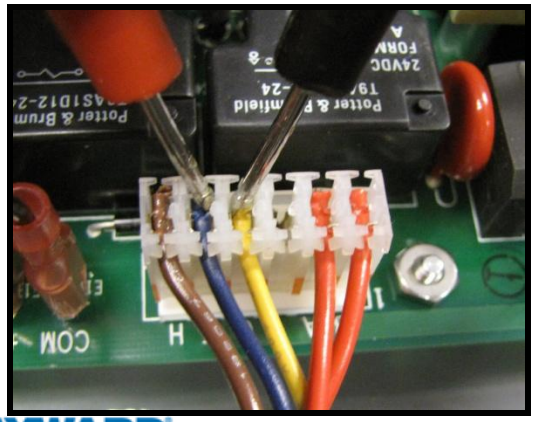
Yellow wire is the common wire to both solenoids
Blue wire is the LEFT Turn solenoid
Brown wire is the RIGHT Turn solenoid

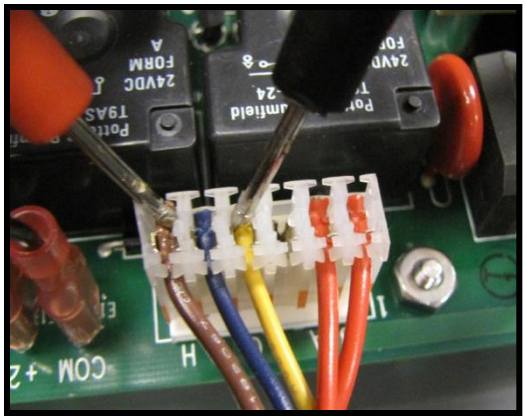
- Using DC Voltmeter, check voltage between the yellow wire and the blue wire. 24 VDC should be present while pushing the LEFT TURN button on the remote

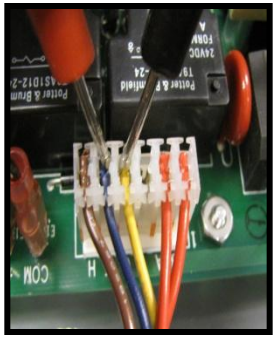
- Using DC Voltmeter, check voltage between the yellow wire and the brown wire. 24 VDC should be present while pushing the RIGHT TURN button on the remote.

- Using DC Voltmeter, check voltage between either the brown or blue wire to yellow. 24 VDC should be present while pushing the REVERSE TURN button on the remote.

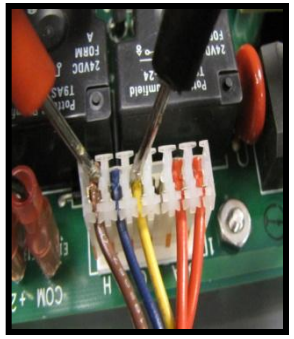
Note: Voltage can vary between 22-28 VDC







or



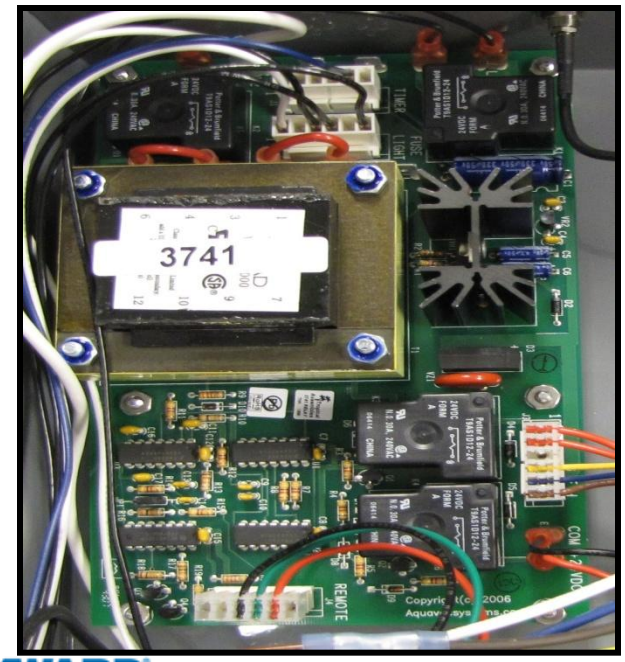
Master Control Panel

Step 25:

1. After testing the RELAY PCB Board (Step 24), if the tests do not match the correct voltages, then the RELAY PCB Board will need to be replaced.

2. If the problem still exists after replacing the RELAY PCB Board, remove the cannon plug from the master control panel. Insert the jumper wire into the 2 center ports of the connector plug at the master control panel. Repeat steps 24 & 25. If steps 24 & 25 pass the testing, the motor and cord need to be test separately to determine which one needs to be replaced.

1.



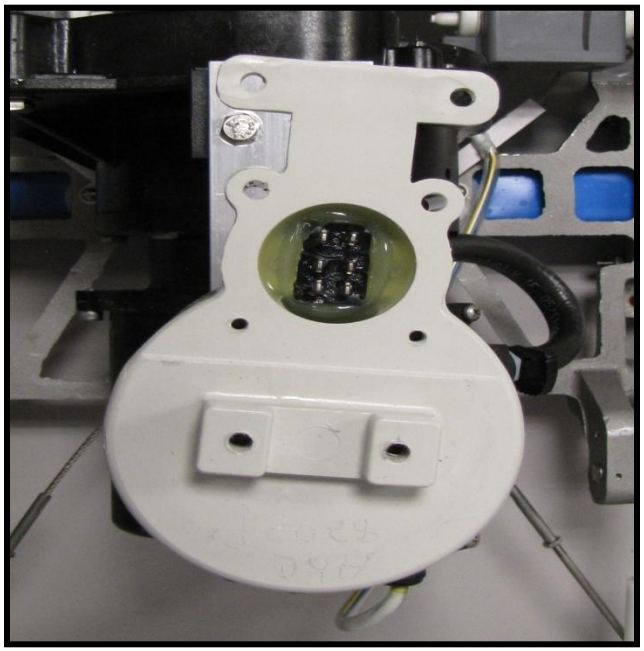
2.

Voltage Check to Swivel

Step 26:

To verify voltage is passing through the power supply cord to the swivel :

1. Power the system off
2. Disconnect the power end connection at the swivel
3. Power the system ON and make sure the RUN light is illuminated.
4. Put meter leads on the black and white ports. 115 VAC should be present. If not, verify breaker is good, ON switch is ON, and all power is correct.



POWER END CONNECTION

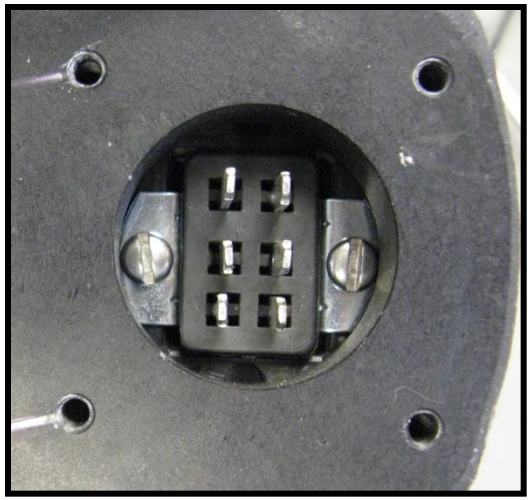
Voltage Check to Motor

Step 27:

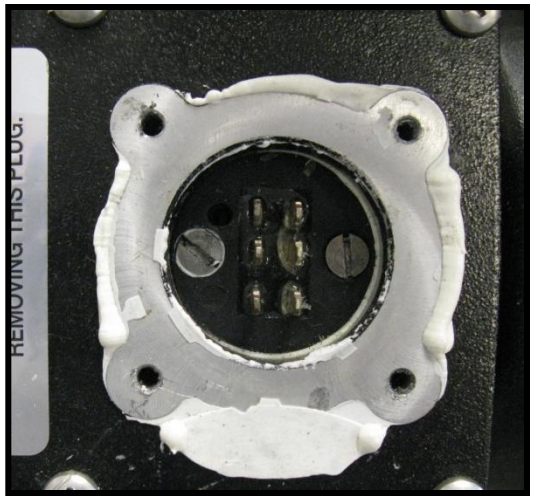
To verify voltage is getting through the swivel to the MOTOR :

1. Power the system off
2. Disconnect the power end connection at the motor
3. Power the system on and make sure the RUN light is on the display
4. Put meter leads on the white and black ports, you should get 115 VAC

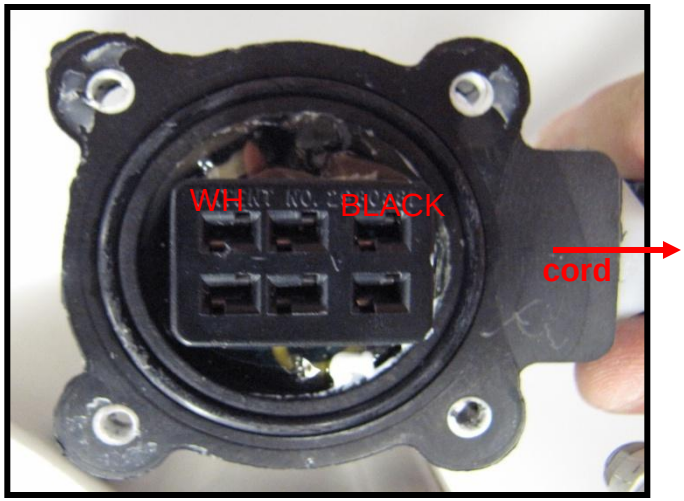
Old motor



New motor



Power end connection



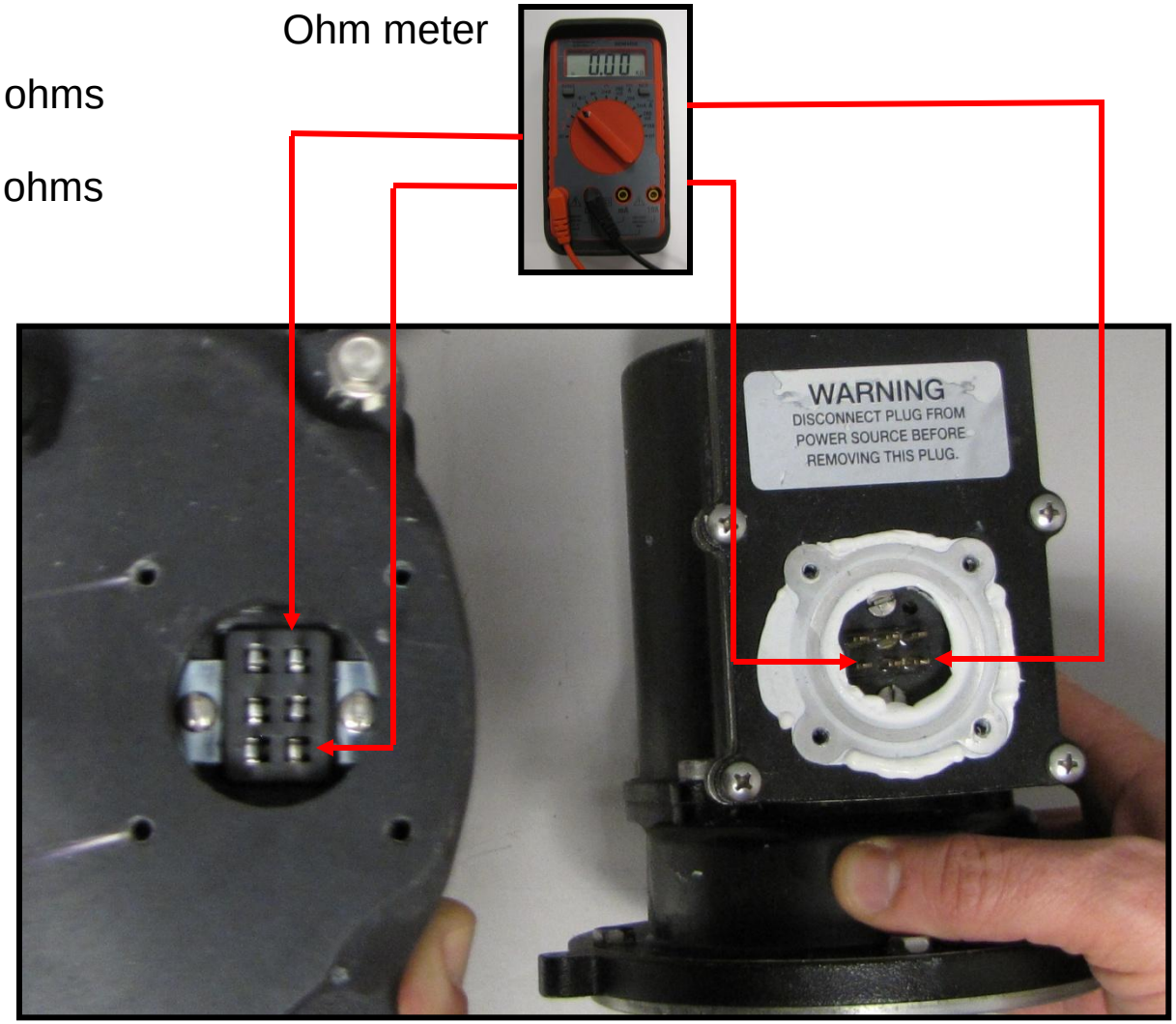
Ohm Check at Motor

Step 28:

-0.9 ohms-1.3 ohms for 115 VAC

-4.3 ohms-6.3 ohms for 240 VAC

Ohm meter



Cord Inspection

Step 29:

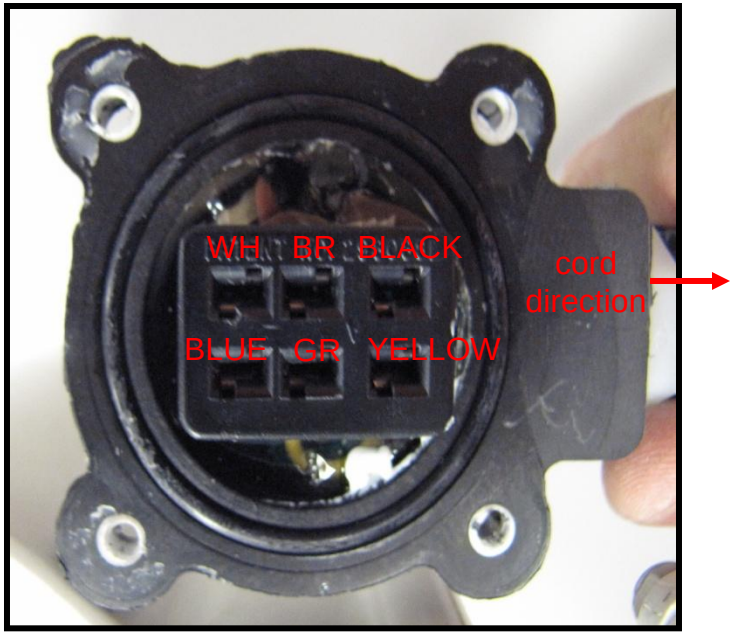
Undo the power connection at the swivel. Remember to replace the o-ring and to use RTV #162 silicone rubber sealant when reconnecting the swivel connector end.

1. Make sure the cannon plug is connected. Power the unit on. Press the start button until Run is displayed.

2. Put one meter lead into the white port, and one meter lead into the black port at the swivel connector end where it connects to the swivel. 115 VAC should be present.

1.

2.



SWIVEL CONNECTOR END

KingShark 2 / KingShark 2 Plus Tips

Sensor Bar adjustments and other minor repairs (Make all adjustments in ¼" increments)

A. Raise Sensor Bar if machine:
1. Fails to climb out of deep end.
2. Turns or hesitates on pool drain.
3. Turns away from curved wall too soon.

B. Lower Sensor Bar if:
1. Tips over before tripping or sensing wall.
2. Turns or hesitates on pool drain.

C. Sensor Bar adjustments required if machine turns in circles or twists cord:
1. Sensor bar not level or too high, possibly hitting the hood.
2. Thread on reversing arm is worn or stripped, not allowing reversing mechanism to disengage.
3. Sensor Bar Cable screws are loose.
4. Sensor Bar Cable is broken.
5. Drive Wheel is broken.

Check Sensor Bar regularly and keep the sensor bar level at all times !

Loss of vacuuming action
1. Filter may be clogged, slowing the flow of water through the unit. Clean the filters.
2. Suction area may be obstructed by large debris. Unplug power cord and remove obstruction.

No apparent power
1. Electrical outlet may be dead. Check electrical GFCI outlet. Check Fuses and breakers. Verify power switch is on.
2. Object lodged in the impeller.
3. Unit runs for a short distance and stops. Check for over load of the electrical circuit or faulty motor. **DO NOT USE EXTENSION CORDS**
4. Motor runs but machine becomes or is motionless. Gear box could be worn or drive pin could be sheared.

Machine tips over
1. Filters are dirty.
2. Sensor Bar set too high.
3. Tipping in certain situation can be prevented by purchasing a float and installing per instructions.

Disconnecting and removing the unit from the pool immediately after each use will enhance the life of the cleaner. 4 hours operation in a 50' x 100' pool should be sufficient with not more than a few twists in the cord which should be straightened out after each use.

Serial Number Locations – March 2010 & prior

Serial numbers for the Commercial Units can be found in the three locations indicated below

First two numbers of a serial number:

10 = MAKOSHARK
30 = MAKOSHARK2
50 = KINGSHARK
70 = KINGSHARK2
90 = KINGSHARK2 PLUS

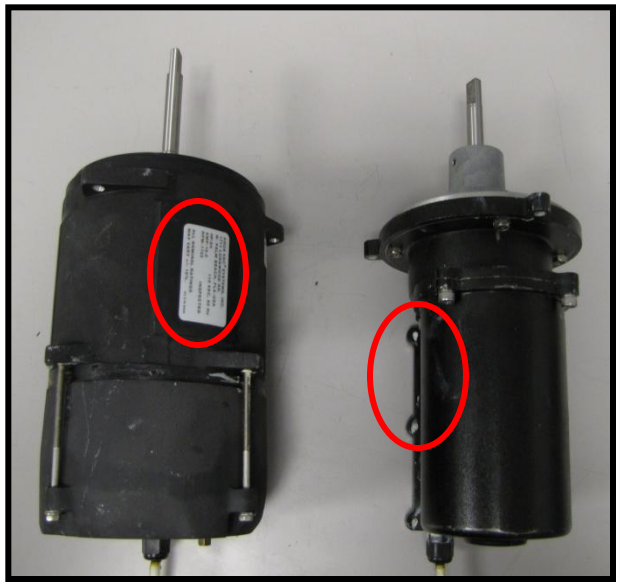
LETTER:

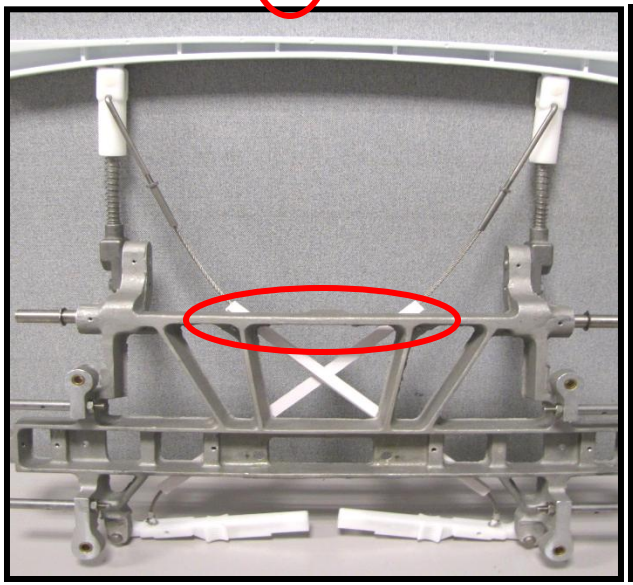
A=January
B=February
C=March
D=April
E=May
F=June
G=July
H=August
J=September
K=October
L=November
M=December

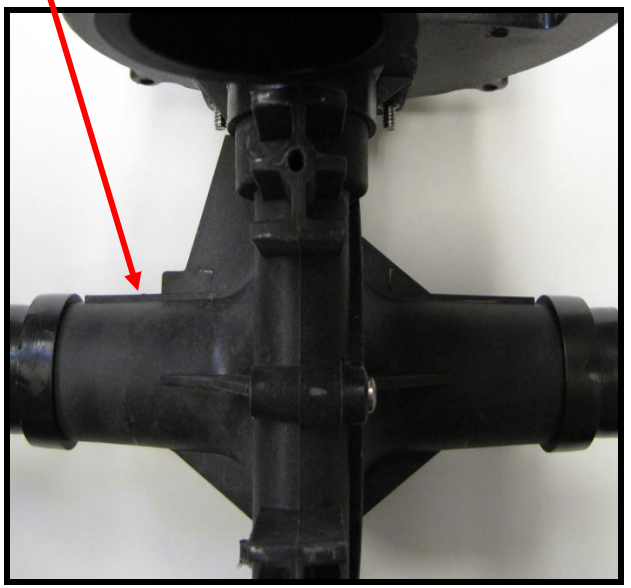
* Fourth Position indicates year of manufacture

For example, 9 = 2009

(bottom side of Gear Box Assembly)







Serial Number Locations after March 2010

Currently we are using the 17 digit serial number sequence used on Hayward products. This will be located on the gear box assembly and on the motor.

Example:

Model #
RC9860DCC

Serial #
21121102005246000

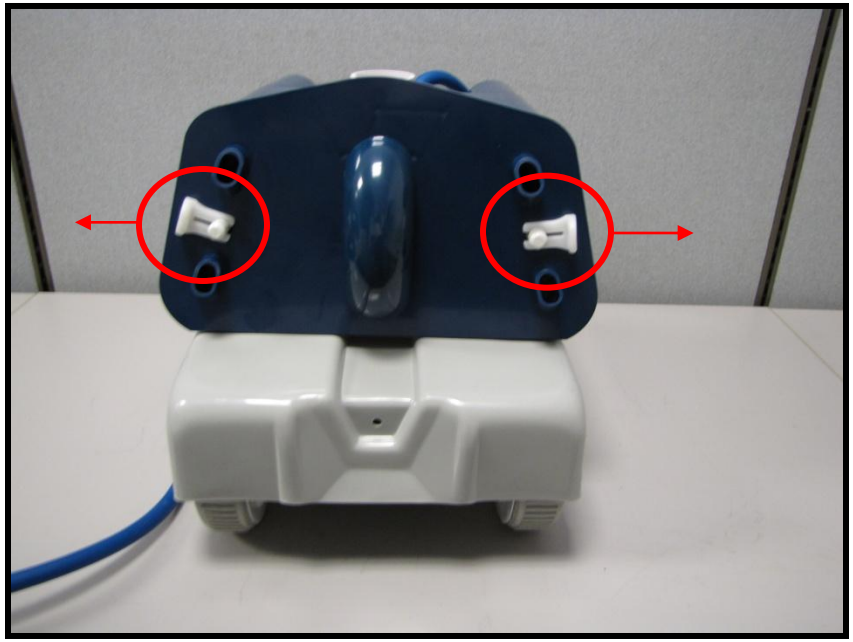
2112 - location made
11 - year made
02 - month made

Mako 2 & King Shark Troubleshooting

TABLE OF CONTENTS

Filter Removal	Page 40
Handle Removal	Page 41
Filter Housing Removal	Page 42
Hood Removal	Page 43
Cord Assembly Removal	Page 44
Drive Belt Removal	Page 45
Gearbox Assembly Removal	Page 46
Impeller and Motor Removal	Pages 47-48
Pump Housing and Base Disassembly	Pages 49-52
Troubleshooting	Pages 53-54

Filter Removal



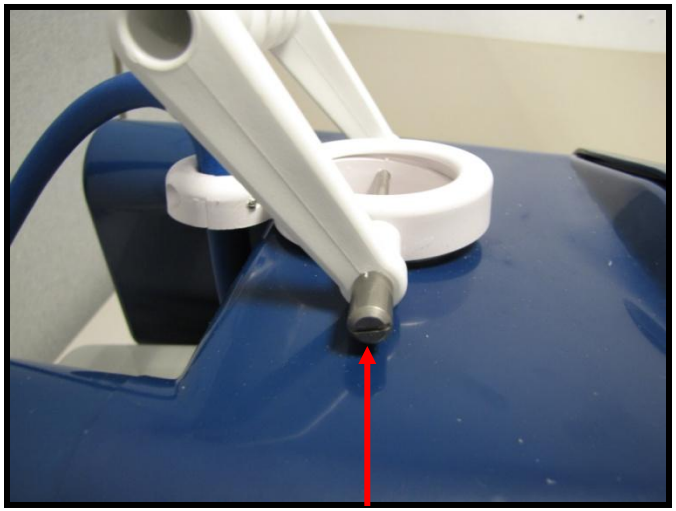
Step 1: Remove both clips from the rear of the unit.

Step 2: Remove the back cover from the filter housing.

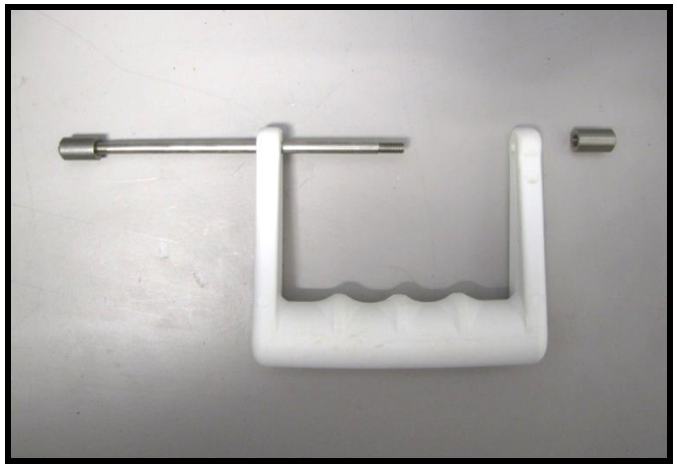
Step 3: Remove filter elements.

Note: Elements can be cleaned by gently spraying with a garden hose. Be careful not to use high pressure as this may cause damage to the elements.

Handle Removal

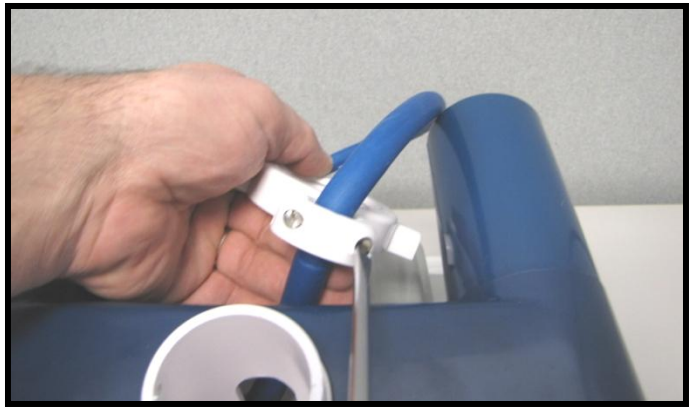


Step 1: Use a flat head screwdriver on both ends of the handle pin to unscrew and remove.

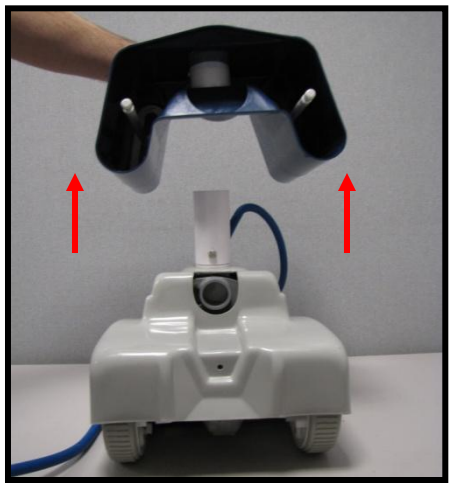


Filter Housing Removal

Step 1: Slide Ring Adapter off the housing and remove the two screws to remove the ring adapter from cord.

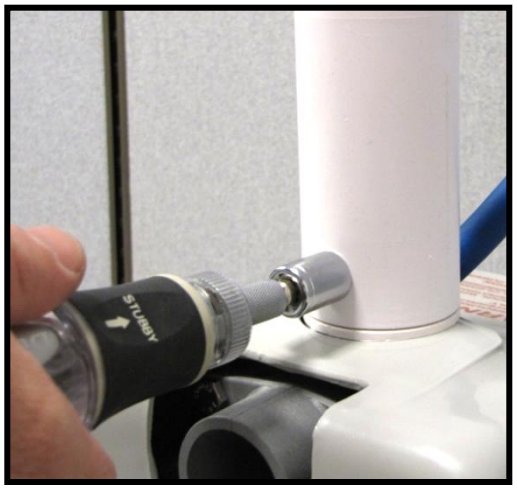


Step 2: Lift the filter housing from the cleaner.

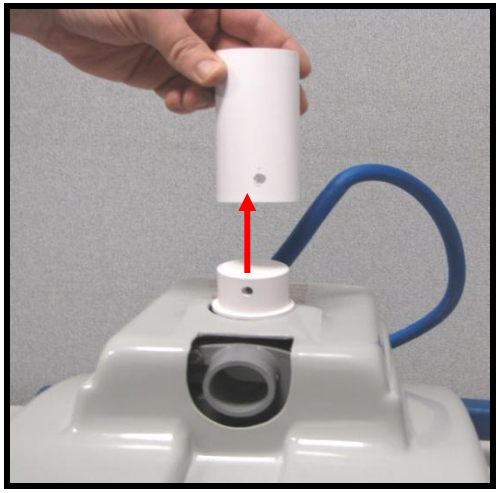


Hood Removal

Step 1: Remove the bolt from the handle riser using 7/16” socket.

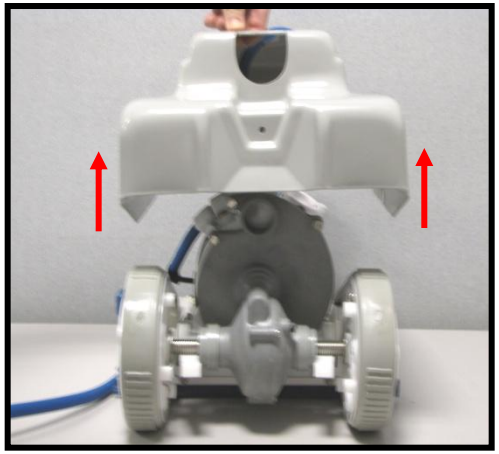


Step 2: Remove the handle riser.



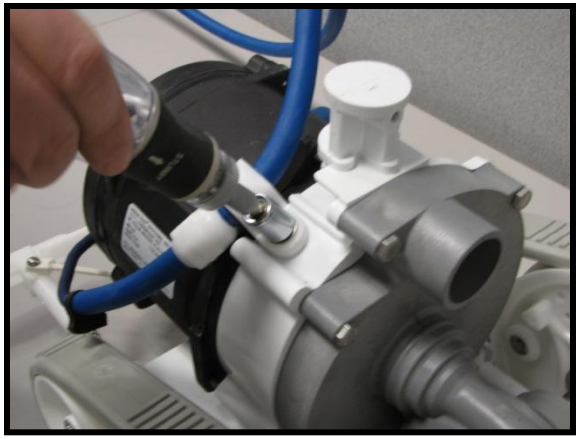
Step 3: Remove the hat riser.

Step 4: Lift the body off.

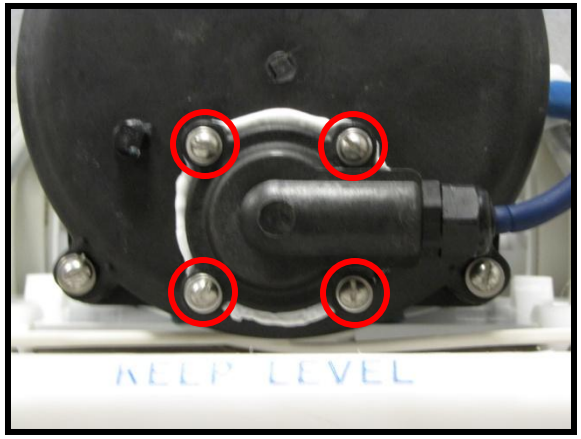


Cord Assembly Removal

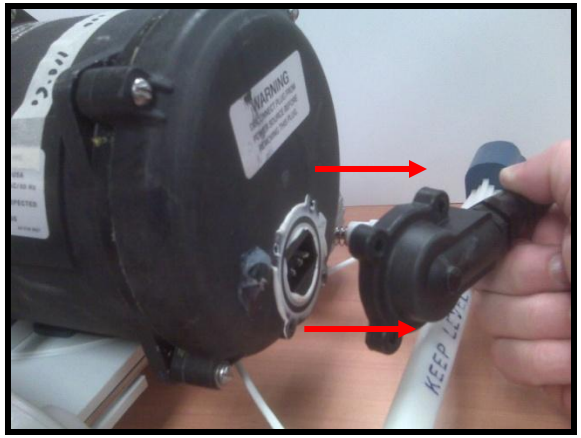
Step 1: Remove the bolt from the pump housing using a 7/16" socket.



Step 2: Remove the 4 screws from the motor.



Step 3: Pull the plug away from the motor.



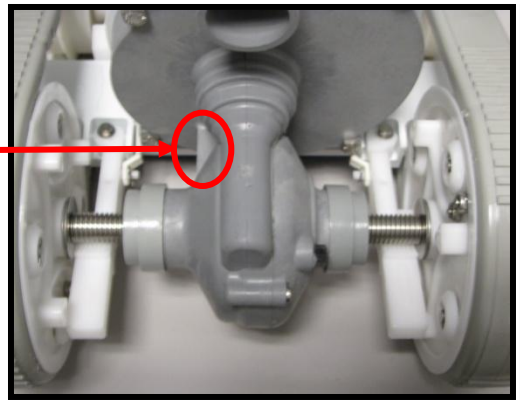
Note: When replacing the cord assembly clean surface thoroughly and use new o-ring and RTV #162 White Silicone for a water tight seal.

Drive Belt Removal

Step 1: Looking at the cleaner from the rear, remove the **RIGHT** drive belt from the rear wheel, and then the front wheel.

Step 2: Remove the **LEFT** belt.

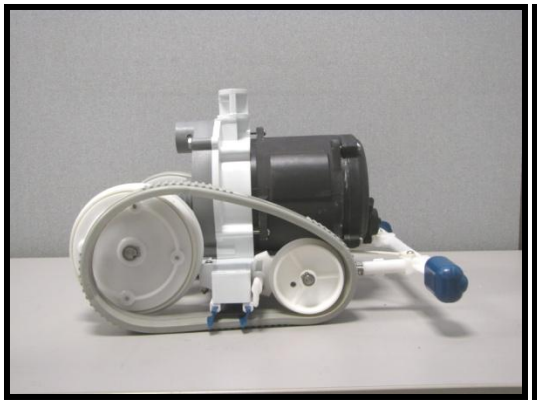
Note: Look at the cleaner from the rear and note that the gear box has a Support on the left side of the unit.



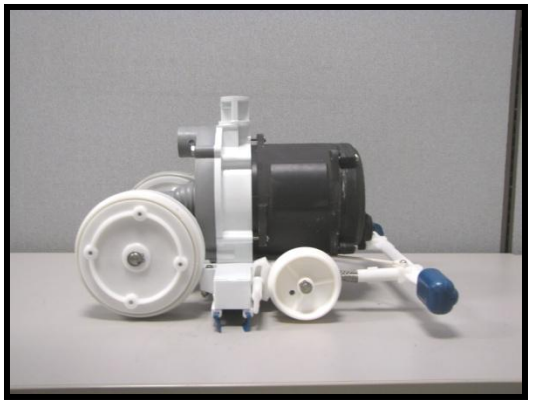
Left **Right**

Note: When installing the drive belts install the **left** belt first and then the **right** belt. This will remove stress from the right side of the gearbox which does not have the additional support.

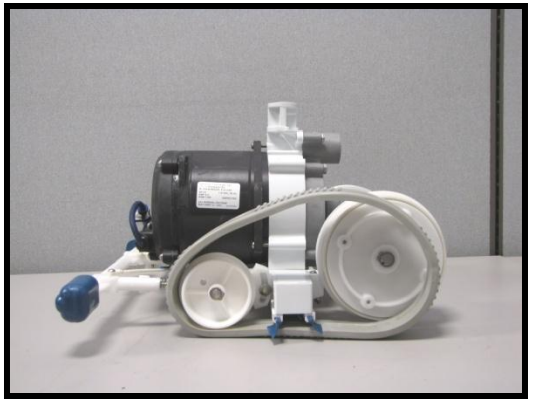
1.



2.



3.

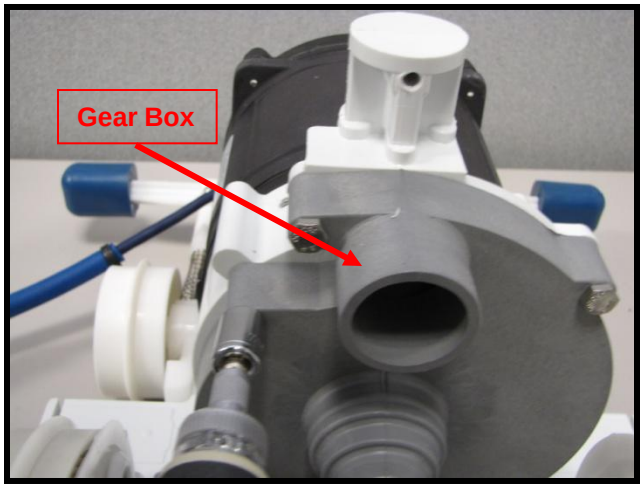


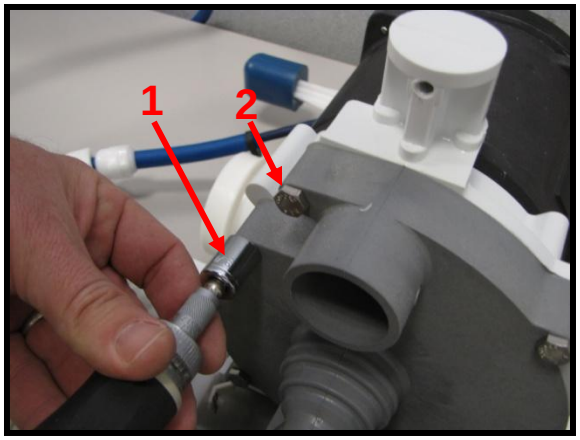
4.

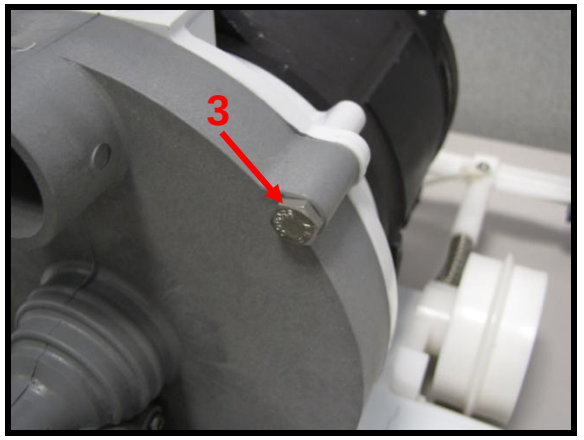
Gear Box Assembly Removal

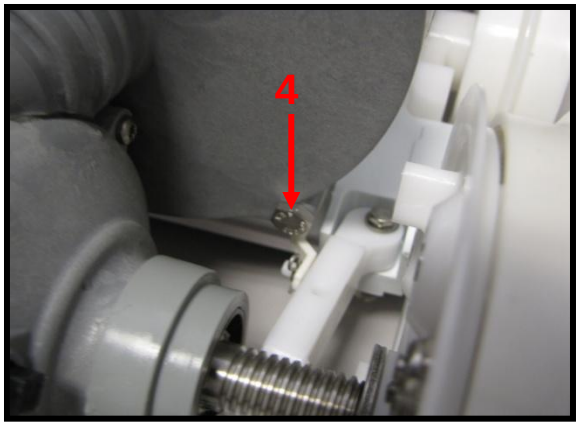
Step 1: Remove the five bolts from the rear of the gear box assembly using a 7/16" socket.

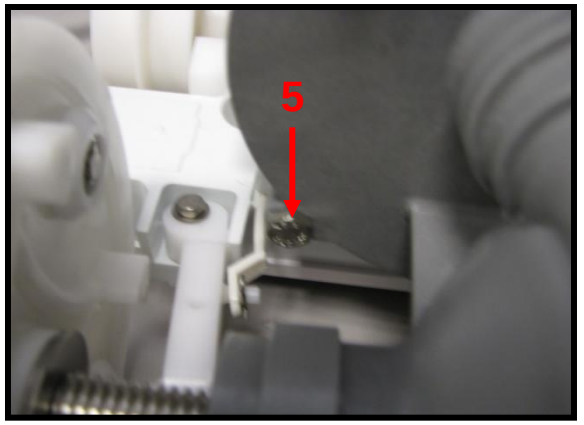
Step 2: Pull the gear box away from the pump housing.





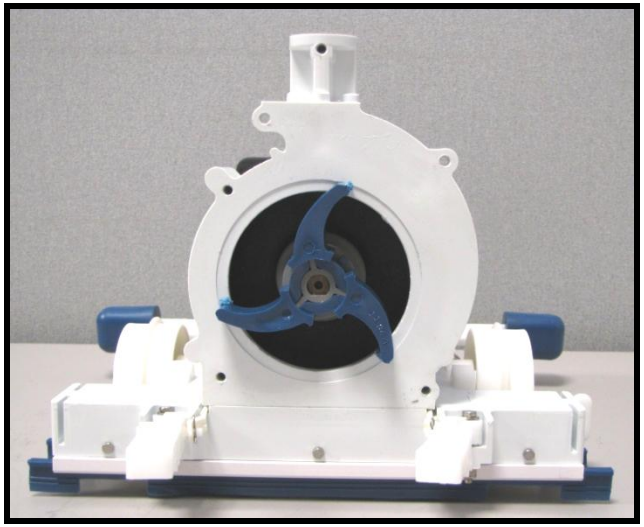




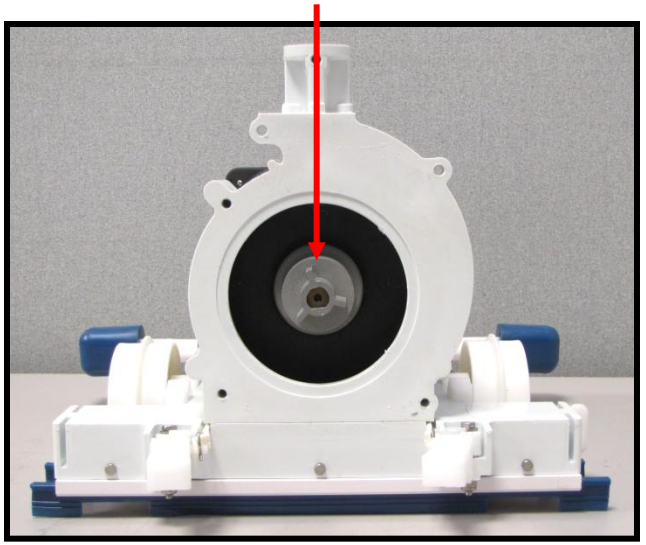


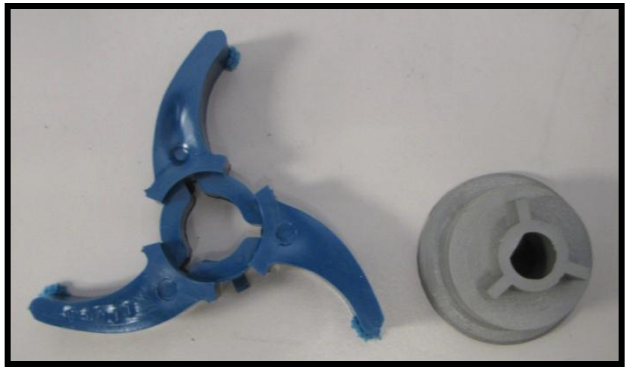
Impeller and Motor Removal

Step 1: Pull the impeller from the impeller drive collar.



Step 2: Pull the impeller drive collar from the motor shaft.

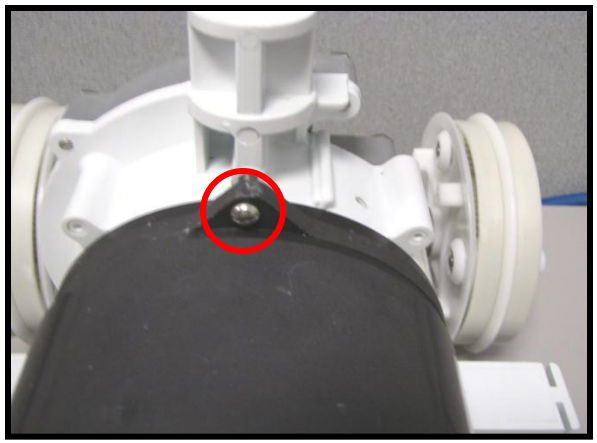




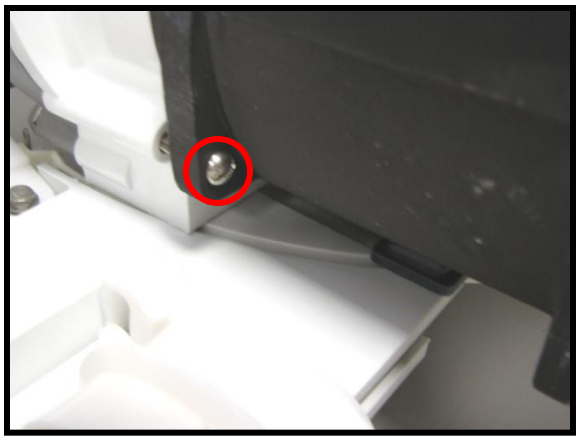
Impeller and Motor Removal

Step 3: Remove the 3 motor screws.

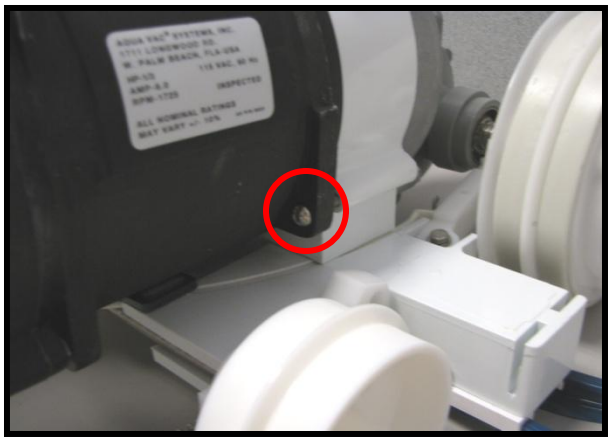
Step 4: Slide the motor away from the pump housing.



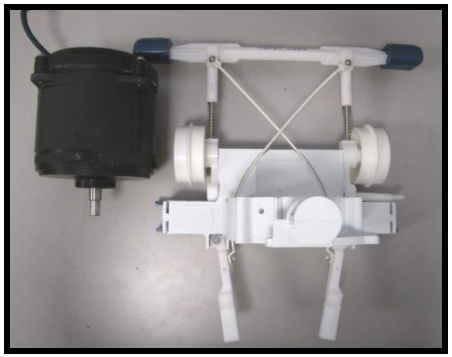
1.



2.



3.

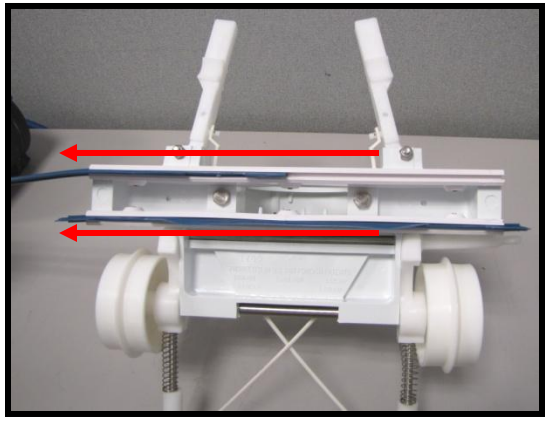
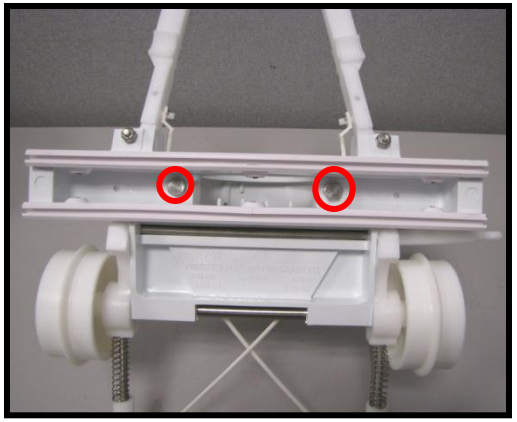


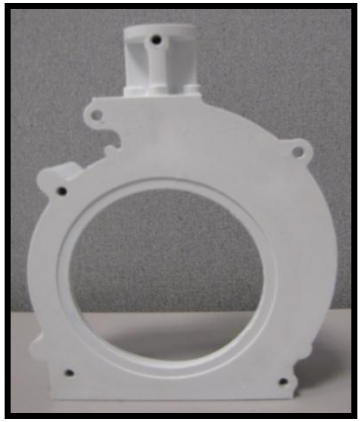
Pump Housing and Base Disassembly

Step 1: Remove the 2 blue intake blades by pulling them from the slide.

Step 2: Remove the two bolts from the bottom of the unit using a 1/2" socket.

Step 3: Remove the pump housing from the base.

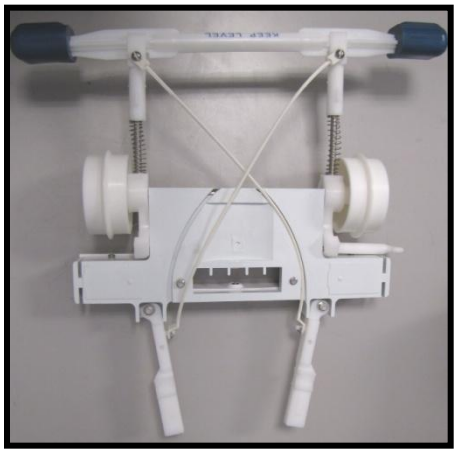


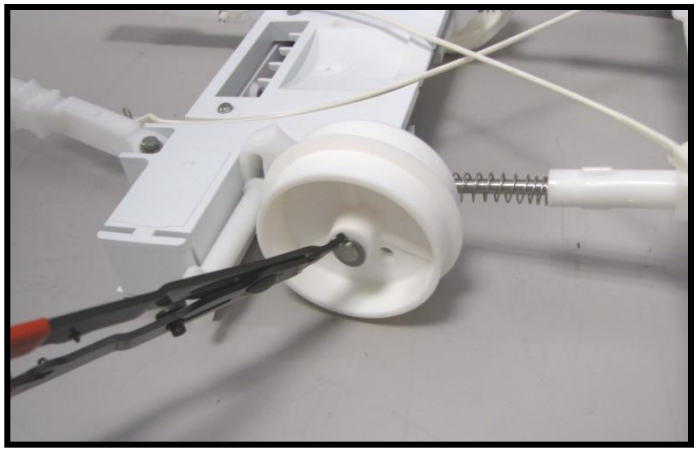
Pump Housing and Base Disassembly

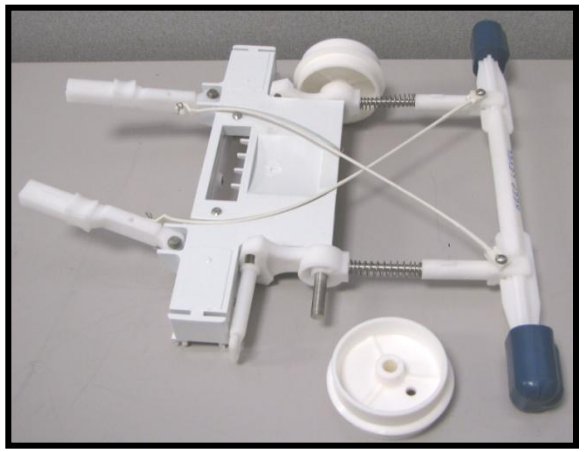
Step 4: Remove the snap ring from the front wheel.

Step 5: Slide the wheel off of the axle.

Step 6: Repeat the 2 previous steps on the opposite side of the base.



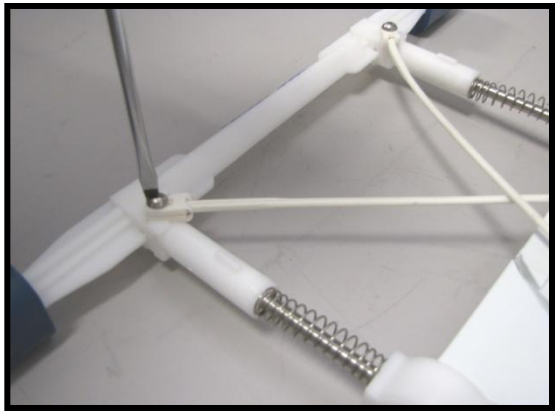
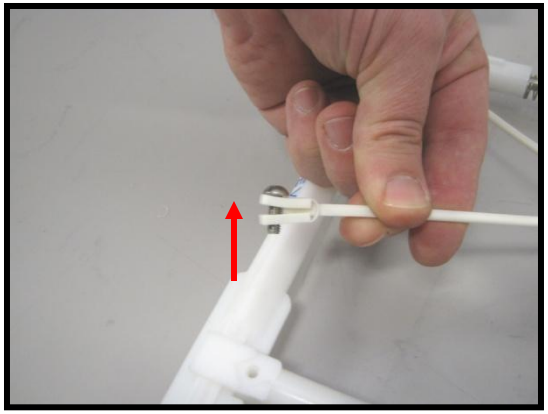
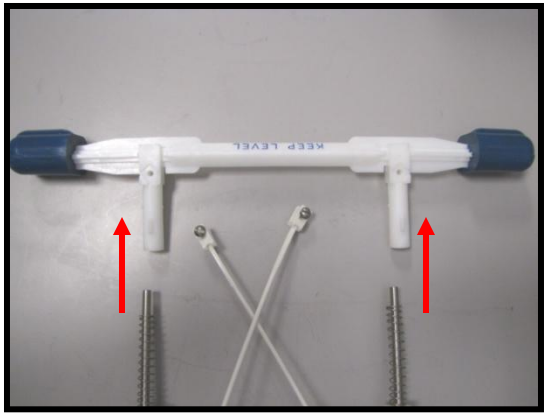




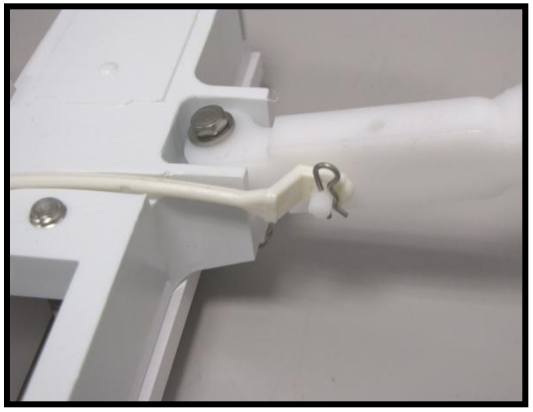
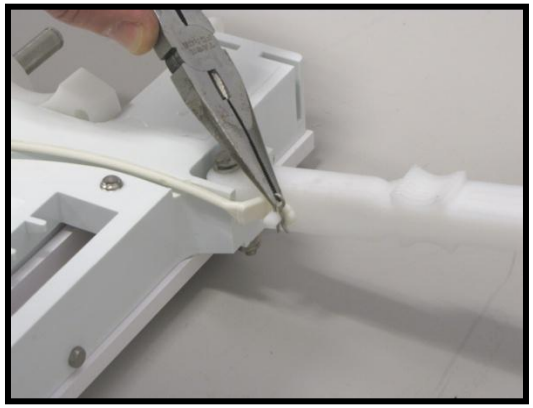
Note: Sensor Bar and Reversing Arms are both reversible. As they become worn, they can be turned over to use the other side. This will extend the life of the part.

Pump Housing and Base Disassembly

Step 7: Remove the 2 flat head screws from the sensor bar. This will allow removal of the sensor bar from the base.

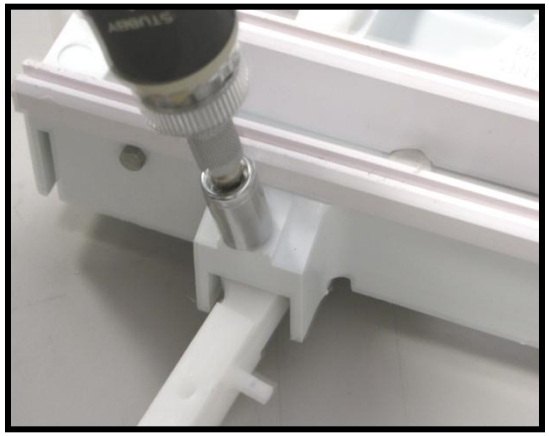




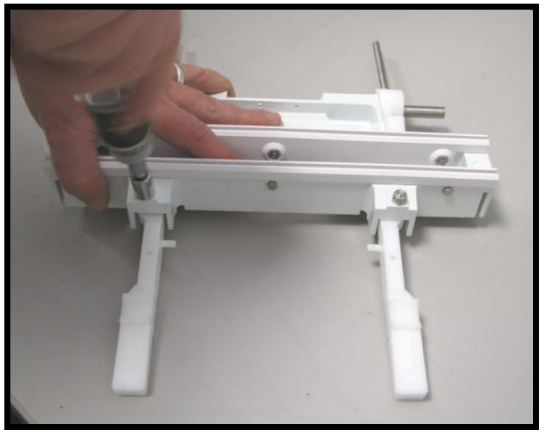
Step 8: Pull the 2 cotter pins at the opposite end of the cables.

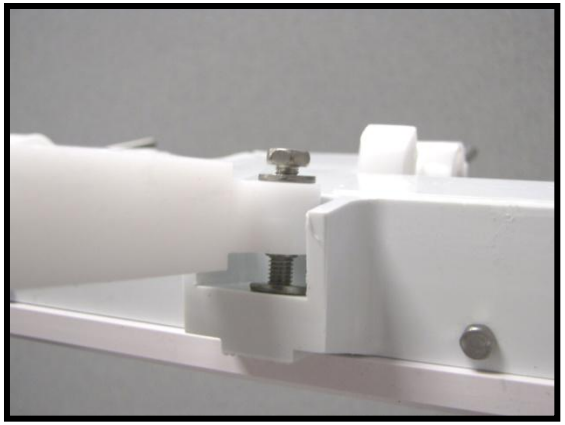
Pump Housing and Base Disassembly

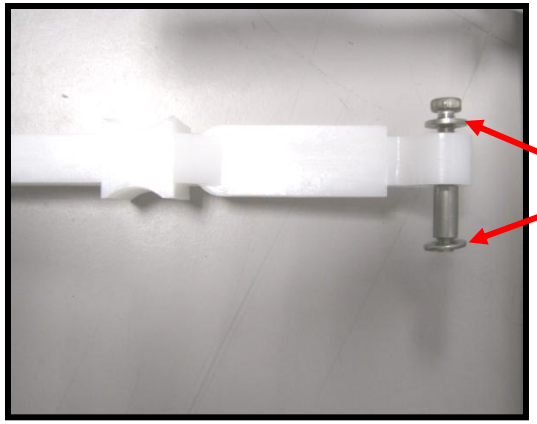
Step 9: Remove the two bolts from the reversing arms using a 5/16” socket.





Note: There are washers located on either side of the reversing arm to allow smooth movement.





Note: The steps to disassemble & reassemble the drive wheels are identical to those of the KingShark II and KingShark II Plus. Detailed steps can be found on pages 14 – 17.

Troubleshooting

Sensor Bar adjustments and other minor repairs (make all adjustments in ¼" increments).

A. Raise Sensor Bar if machine:
   1. Fails to climb out of the deep end.
   2. Turns or hesitates on pool drain.
   3. Turns away from curved wall too soon.

B. Lower Sensor Bar if:
   1. Tips over before tripping or sensing wall.
   2. Turns or hesitates on pool drain.

C. Sensor Bar adjustments required if machine turns in circles or twists cord.
   1. Sensor Bar not level or too high possible hitting hood.

      OR

   2. Thread on reversing arm #RC1703 is worn or stripped not allowing reversing mechanism to disengage.
   3. Sensor Bar cable screws are loose.
   4. Sensor Bar cable is broken.
   5. Drive wheel is broken.

D. Remember this basic rule:

Check Sensor Bar regularly and keep the Sensor Bar level at ALL times.

Troubleshooting

Loss of vacuuming action:

A. Filter may be clogged, slowing the flow of water through the unit. Clean the filters.
B. Suction area may be obstructed by large object.

No apparent power:

A. If the machine does not move:
    1. Verify power at the electrical outlet.
    2. Object lodged in impeller.
    3. A short in the motor, check the ground fault interrupter.
    4. Unit runs for a short distance and stops. Check for overload of the electrical circuit or faulty motor. **(DO NOT use extension cords.)**
    5. Motor runs but machine becomes or is motionless. Gear box could be worn or drive pin could be sheared.

Machine tips over:

A. Filter loaded with sand or debris.
B. Sensor Bar is set too high.